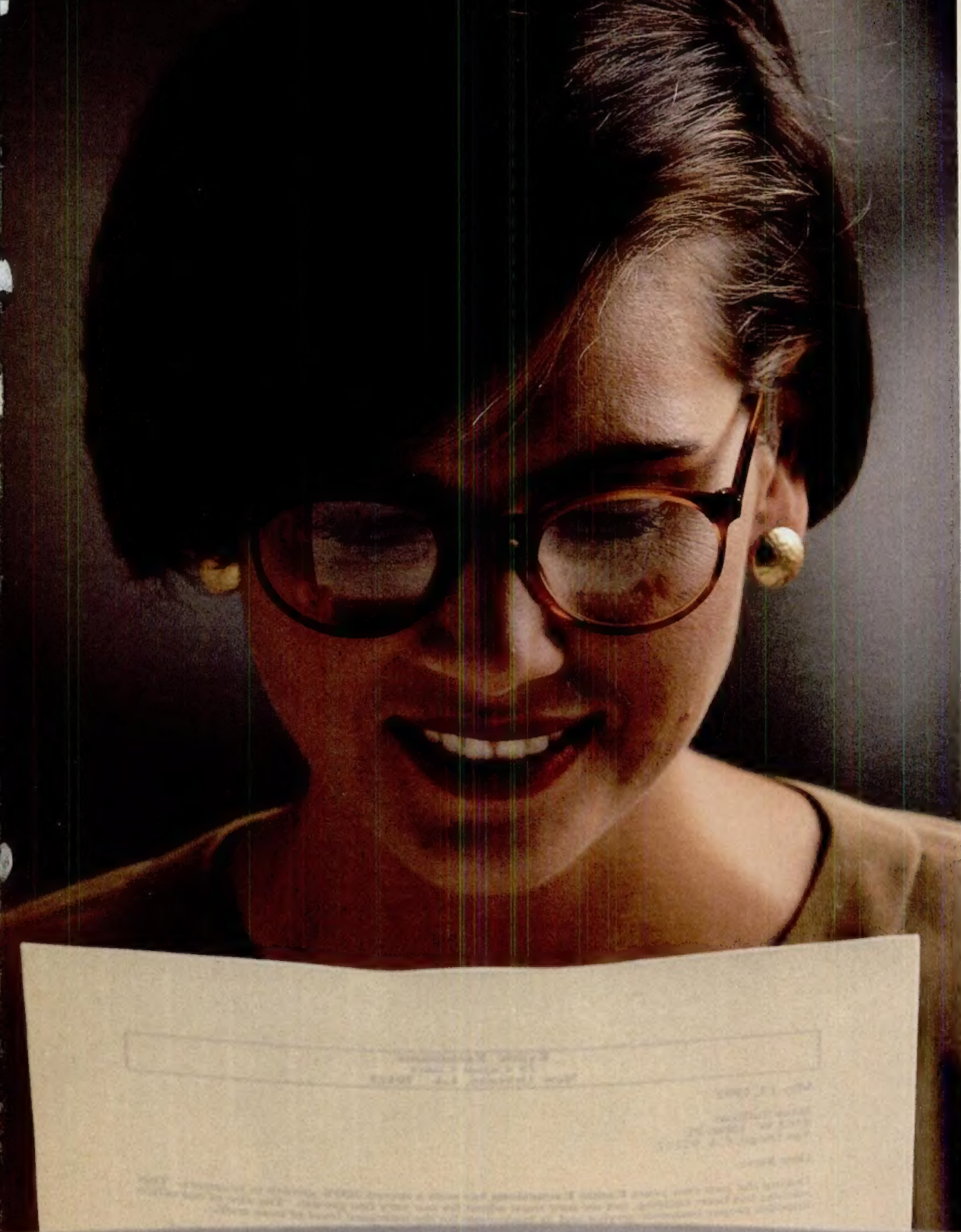




The Wor

Introducing New CA-Textor. The Friendliest,

Have you heard?

Everybody is talking about new CA-Textor™ For Windows, the first and only word processor that makes writing almost as easy as talking.

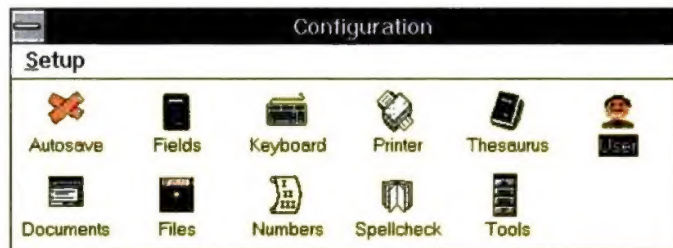
You'll have CA-Textor up and running in seconds. And thanks to its graphical, easy-to-use design, you'll be adding more power

and persuasion to memos, letters, briefs and reports almost instantly—all with just a few clicks of the mouse.

You can write and edit documents in standard, draft or WYSIWYG modes. (WYSIWYG means "What You See Is What You Get." Get it?)

You'll be amazed at how simple it is to make your work look spectacular.

That's because CA-Textor supports over 300 different fonts, plus a full array of type styles and colors. You'll quickly discover that changing the



CA-Textor's friendly, graphical design helps you work smarter than ever with just a few clicks of the mouse.

way your words look on screen and on paper is really almost as easy as changing your mind. But that's not all.

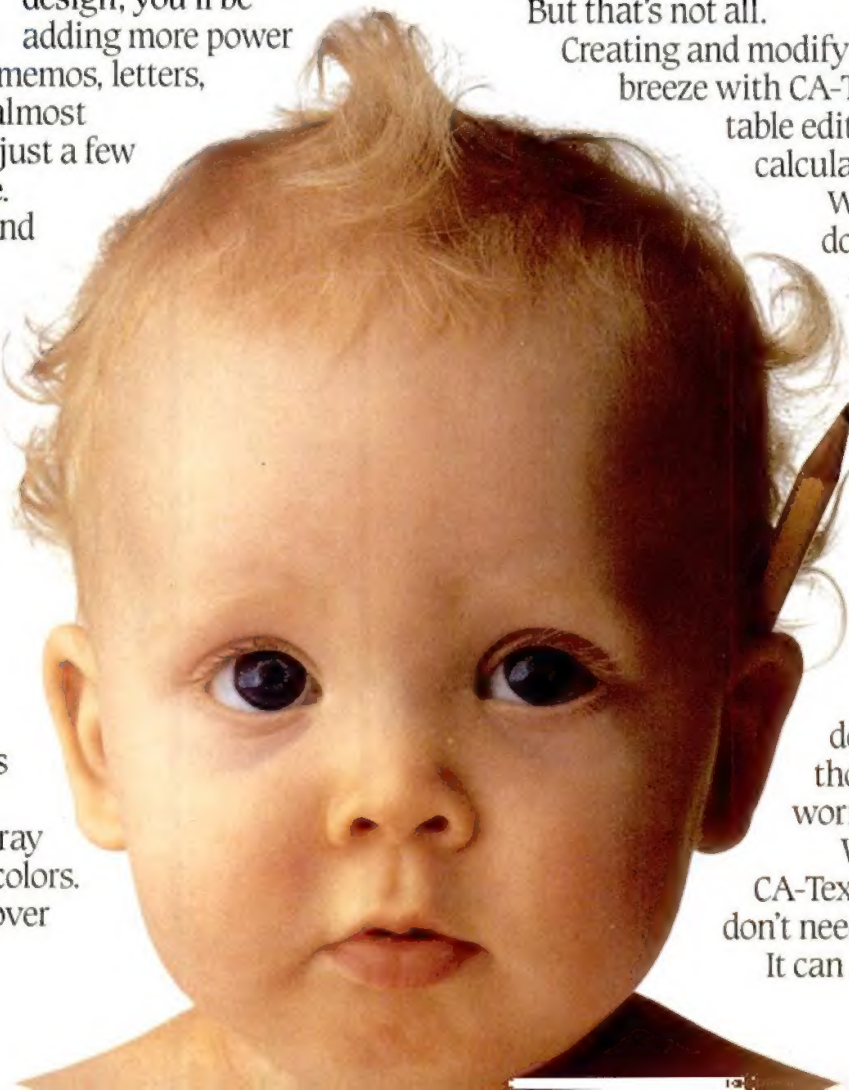
Creating and modifying tables is a breeze with CA-Textor's powerful table editor and dynamic calculation cells.

Work on multiple documents at the same time with its advanced MDI interface.

Or insert pictures for added impact, including CGM, TIFF, WMF, WPG and BMP file formats.

And if you don't know what those mean, don't worry about it.

With new CA-Textor, you don't need to. It can even



CA-Textor.

Easiest Word Processor You Will Ever Meet.



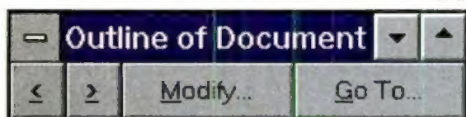
With support for almost 300 typefaces and dozens of colors, you can really add new meaning to the phrase, "It's not what you say...it's how you say it."

proofread your work with four user-defined dictionaries, plus a spell-checker that understands American English, British English and French.

That's right—French!

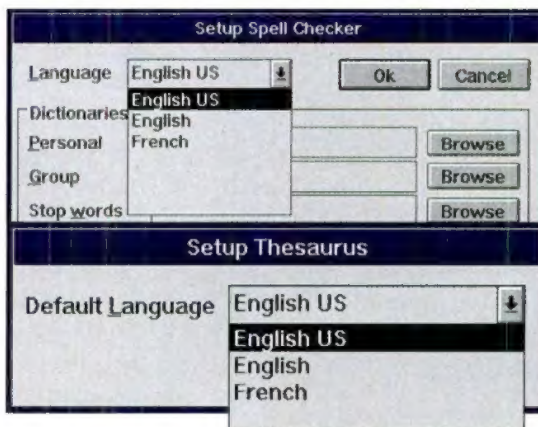
CA-Textor is so user-friendly, it even lets you customize its feature-rich tool bar to match your own personal specifications.

Decide where the tool bar appears on your screen.

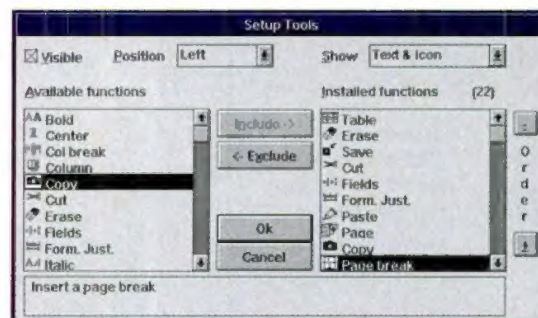


Creating outlines has never been easier. Modify numbering levels and change headings instantly.

Select icon and text formats for tool buttons.



You'll never be at a loss for words with CA-Textor's powerful and easy-to-use thesaurus and spell checker. It's so smart, it even understands French.



Customize the feature-rich tool bar in just seconds. Decide which tools you want, how they'll look and where they'll appear on screen.



You can even arrange the sequence of push buttons you use most frequently.

To order your free CA-Textor For Windows Demo Disk, just dial 1-800 CALL CAI.

Do it right now. And don't forget to tell 'em that you heard it here first.



COMPUTER ASSOCIATES
Software superior by design.

Eliminate islands of automation.



Macola Accounting Software powers corporate connectivity.

Unproductive islands exist throughout your company... computerized departments that can't communicate.

Now they can. With Macola Software, you can bridge these communication gaps and seamlessly connect your PCs and your people. Imagine the benefits of linking these departments for shared operations, reporting and analysis:

Inventory	Accounting
Purchasing	Manufacturing
Shipping	Sales/Marketing
Maintenance	Engineering
Point-of-Sale	Executive Office
MIS/DP	Customer Service

Your productivity bridge.

Eliminating your islands of automation begins with Macola Accounting Software. Macola processes the information flow from all departments so you can get the right information to the right person at the right time. For all the details, call today.

1-800-468-0834

MACOLA[®]
SOFTWARE

333 E. Center St. Marion, OH 43302-4148

Macola is a registered trademark of Macola, Inc. Copyright 1992.

Inside

The trees of high technology grow so quickly that we often fail to see the forest. The computer industry, raucous and competitive in its obsession with breathless change, has little time for introspection.

Is the latest version of this or that product

better than the last one? Which operating system will win the struggle for the hearts and CPUs of computer users in the 1990s? The passions often suggest battles that are more ideological and territorial than technological.

The changes are real, but often they are not what gets the most attention. The lineup of articles in this issue reflects a quiet revolution in the uses of Intel-based personal computers. A few years ago, it was a cliché to say that PCs were great word processing and number-crunching machines but that any serious graphical application required a Macintosh or an Amiga.

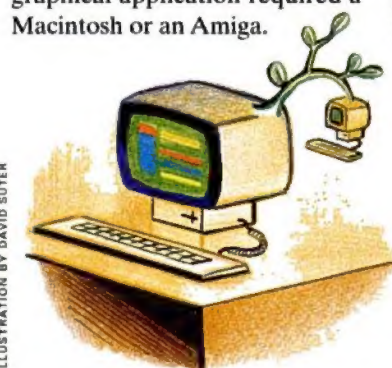


ILLUSTRATION BY DAVID SUTER

Consider this issue's lineup. Our cover story is about Windows desktops. The once-immutable DOS prompt is giving way to the graphical user interface, which has enabled a thousand desktops to bloom. Here, we review 20. For growing numbers of our readers, the shift to GUI

means they can customize their desktop to work *just* the way they want.

"VGA-to-NTSC Boards" uncovers the intricacies of trading images between a TV or VCR and a computer. Until a couple of years ago, talk of managing the transfer of video images with a PC would have provoked raised eyebrows and snickers.

"Darkroom, R.I.P.?" takes a look at an entirely new use of computers: the brave new world of altering and modifying photographic images—once considered unalterable truths. Our capacity to alter what was once proof says that what you see ain't necessarily so any more.

Our review of SQL front ends, "SQL the Sequel" is the second of two parts on the most complex and secure type of computer database. These databases were once available only on expensive mainframes and minicomputers, but they have now migrated to the PC platform.

Each of these articles covers a topic we would not have associated with PCs three or five years ago. The lasting power of the PC has been its flexibility and its capacity for evolution. As long as the trees keep growing and mutating, the forest will never be dull.—Joel Dreyfuss

PC Magazine: The Independent Guide to Personal Computing, ISSN #0888-8507 is published biweekly except in July and August for \$44.97 for one year. Ziff-Davis Publishing Co., a division of Ziff Communications Co., One Park Ave., New York, NY 10016. Second class postage paid at New York, NY 10016 and at additional mailing offices. POSTMASTER: Address changes to PC Magazine, P.O. Box 54093, Boulder, CO. 80321-4093.

Attention All dBASE Users: Your Windows Have Arrived.

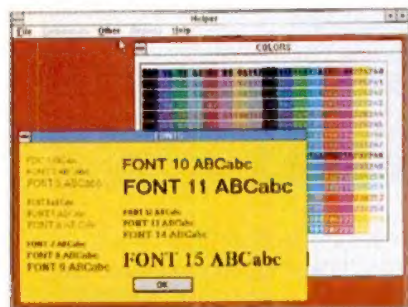


Introducing new dBFast™. The first and only dBASE™ compatible database and

dBASE/X-Base language for Windows. It's the fastest, smartest and easiest way for millions of users and developers to join the Windows revolution.



Graphical, colorful dBFast will bring new life to all of your



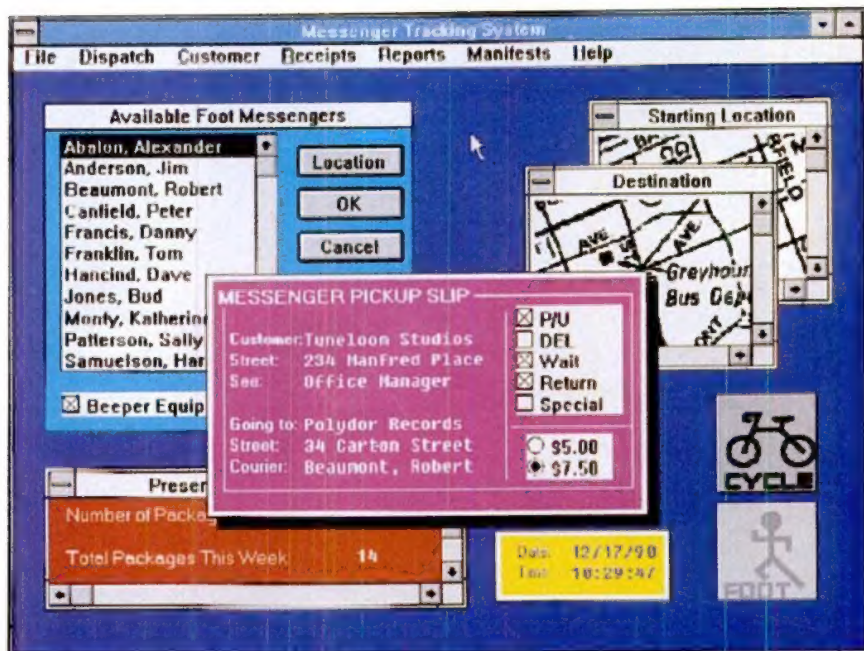
Your applications will really come to life with multiple colors and fonts.

existing dBASE programs.

Liven them up with multiple, movable windows, pull-down menus, check boxes, dialog boxes, radio buttons, push buttons and bitmap pictures.



dBFast also helps



dBFast helps you create powerful, graphical database applications quickly and easily with pull-down menus, check boxes, radio buttons and even bitmap images.

you create new dBASE programs quickly and easily.

Unlike other Windows development systems that force you to learn a new language, dBFast allows dBASE, Fox and Clipper developers to use the language they already know with more than 200 extensions and an interactive editor, compiler and linker.

And full industry standard DDE and DLL protocols allow

your programs to communicate with other Windows applications.

So call 1-800-CALL CAI and we'll rush you a free Demo Disk.

Call right now. After all, haven't you waited long enough?

COMPUTER ASSOCIATES
Software superior by design.



dBFast™



PostScript printing on your LaserJet doesn't have to be such a pain.

With HP's PostScript Cartridge Plus, things will go more smoothly.

Say goodbye to the needling you've come to expect from PostScript emulations. HP's PostScript Cartridge Plus is the only cartridge that provides genuine PostScript Level 2 software from

Adobe for HP LaserJet III, IIID and IIIP printers. So regardless of complexity, PostScript language files will always format and print consistently.

The automatic language switching eliminates rebooting when switching between PCL5 and PostScript language files. Conveniently, HP's PostScript Cartridge Plus works out-of-the-box on your Novell network.

Of course, HP's PostScript cartridge in an HP LaserJet means complete compatibility and one-vendor support. And because your users will be running authentic PostScript



Level 2 software from Adobe, they'll be able to take advantage of the latest versions of application software.

So call 1-800-752-0900, Ext. 7015* for more information and the name of your nearest authorized HP dealer.

You don't want to be stuck with something else.



**HEWLETT
PACKARD**



© 1992 Hewlett-Packard Company PE12270
Adobe, PostScript, and the PostScript logo are trademarks of Adobe Systems Incorporated which may be registered in certain jurisdictions. *In Canada call 1-800-387-3867, Ext. 7015.

UP FRONT

Inside

New uses for PCs4

Letters

PC Magazine's new look
draws more comments19

Trends

- Windows Starts a Family
- Special CPUs for PDAs
- Caller ID Enhancements
- How to Sell Your Old PC29

First Looks

- Quattro Pro for Windows
- Aldus Intellidraw
- IBM 486 SLC2 Processor Upgrade37

New and Improved

BY E. ANDREW TORGAN59

Read Only

EDITED BY CAROL LEVIN71

Toolkits

EDITED BY TRUDY NEUHAUS77

COLUMNISTS

Michael J. Miller

The Compatibility Curse81

Bill Machrone

Kiss and Make Up87

John C. Dvorak

The Bonehead vs. the Power User93
Inside Track95

Jim Seymour

A Trackball in Every Notebook99

William F. Zachmann

Nothing In, Nothing Out105

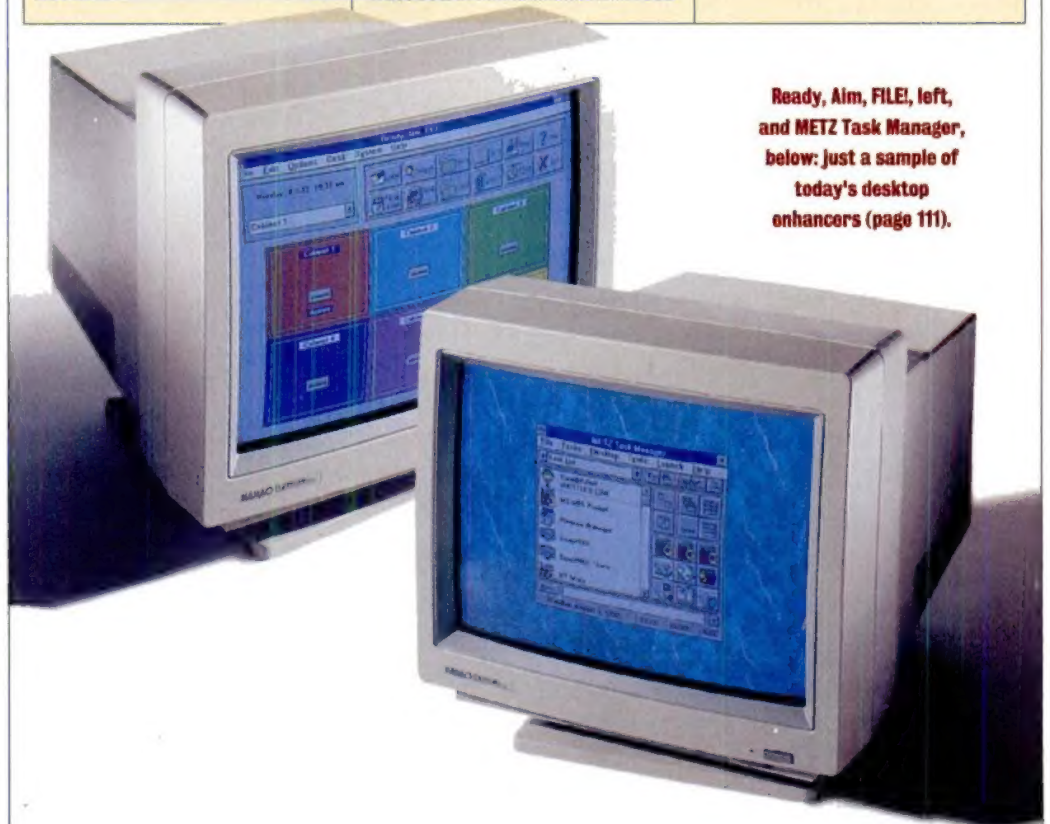
COVER STORY

Software

Windows Desktop Managers: 20 Ways to Remodel Your Desktop

BY ROCK MILLER Even with Win 3.1, Microsoft has left the door open for a host of Windows desktop replacements and enhancers. Today, alternatives abound for the many who want more—or less—than the Program Manager and File Manager provide. *PC Magazine* takes a look at 20 contenders in the Windows desktop market111

<i>Amish Utilities for Windows</i> ... 115	<i>The Norton Desktop for Windows</i> 149	<i>Suitability to Task</i> 112
<i>AttiTools</i> 117	<i>Ready, Aim, FILE!</i> for Windows 153	<i>Editors' Choice</i> 113
<i>BackDesk</i> 117	<i>Salvation</i> 154	<i>Navigating the Windows Workspace with Virtual Desktops</i> 118
<i>BeckerTools</i> 124	<i>Sloop Manager</i> 155	<i>Summary of Features</i> 140
<i>Direct Access Windows</i> 126	<i>SmartPad for Windows</i> 158	<i>Window Dressing</i> 167
<i>File Commander</i> 126	<i>Squeeze</i> 158	<i>The Cabbage Patch</i> 177
<i>hDC Power Launcher</i> 128	<i>K-U-I</i> 141	
<i>HotWin</i> 138	<i>METZ Task Manager</i> 141	
<i>K-U-I</i> 141	<i>Synergy</i> 161	
<i>METZ Task Manager</i> 141	<i>WinEZ Pro</i> 168	
<i>NewWave</i> 147	<i>WinTools</i> 168	



Ready, Aim, FILE!, left, and METZ Task Manager, below: just a sample of today's desktop enhancers (page 111).

Graphics

True-Color Image Editing:
Darkroom R.I.P.?

BY LUISA SIMONE Better support for 24-bit color and cheaper hardware have come together to make the PC a viable platform for color image editing. These eight packages give you tools that are the most powerful ever to manipulate bitmaps—without sacrificing ease of use 185

<i>Aldus PhotoStyler</i> 188	Suitability to Task 186
<i>Image-In-Color and Image-In-Color Professional</i> 201	Editors' Choice 187
<i>ImagePals</i> 205	Performance Tests 192
<i>PhotoFinish and Publisher's Paintbrush</i> 210	Separation Anxiety 202
<i>Picture Publisher</i> 223	Mac Hegemony 207
<i>PixoFoto</i> 231	A Filter Sampler 220
	Summary of Features 222

Hardware

VGA-to-NTSC Boards:
Let's Go to the Videotape

BY LORI GRUNIN Product demos, training seminars, or any presentation that benefits from extensive visual elements can often be distributed to the widest audience via videotape. The eight products we review here are aimed at corporate professionals who want to overlay PC graphics on video and output the combination to tape 239

<i>ADDA VGA-AVer</i> 258	Editors' Choice 241
<i>Aitech ProVGA/TV Plus</i> 263	Performance Tests 249
<i>Cardinal SNAPplus</i> 269	Performance Tests 250
<i>Everex Vision VGA with Overlay</i> 277	For Scan Conversion Only ... 255
<i>Genoa VGA2TV</i> 278	Video in a Window:
<i>Magni VGA Producer Pro</i> 278	NTSC-to-VGA Boards
<i>Truevision VideoVGA</i> 283	Bring Video to Your PC 258
<i>Willow VGA-TV GE/O</i> 289	Summary of Features 266



Clamping down on spikes: 2D Labs tests the ability of 30 surge suppressors to weather a punishing barrage of surges (page 335).

Applications Development

SQL: The Sequel:
Front-end Tools

BY JONATHAN ZUCK How do you reach the data in SQL databases? In our last issue we reviewed the back ends. In this overview, we discuss applications that give you access to this information: SQL front ends 295

<i>ClearAccess for Windows</i> 297	<i>PowerBuilder</i> 326
<i>Personal Access</i> 301	
<i>Quest</i> 302	Summary of Features 300
<i>Forest & Trees for Windows</i> .. 307	Standalone SQL Engines 310
<i>LightShip and LightShip Lens</i> 308	Transparent Data Access:
<i>InfoAlliance for Windows</i> 314	Cross-Platform,
<i>JAM/DBi for DOS</i> 318	Cross-Format 320
<i>ObjectView</i> 322	Other Roads to SQL Access 325

Hardware

Power Protectors:
Surge Suppressors Clamp
Down on Spikes

BY GARY BERLINE AND CATHERINE KUNKEMUELLER Spikes pose a threat to your equipment and to your valuable data. Surge suppressors provide protection against these power disturbances, and some of the best ones do so for a moderate price 335

<i>AESI StediWatt Diagnostic Power Refinery, Model 718</i>	<i>Kensington Microware Power Tree 50</i>
<i>American Power Conversion Surge Arrest Plus</i>	<i>L.E.A. Dynatech CS-615</i>
<i>Brooks Electronics Surge Reactor BN6-6</i>	<i>NCR Pyramid</i>
<i>Brooks Power Systems Surge Stopper BPS-BN6-6</i>	<i>Pacific Electriccord XP</i>
<i>Control Concepts Supertrac ST6D</i>	<i>Panamax Max 6</i>
<i>Current Technology Power Sifter Pro 15</i>	<i>Pass & Seymour/Legrand C6-L</i>
<i>Curtis Manufacturing Ruby Plus Data Shield S100</i>	<i>Perma Power RS610</i>
<i>EFI Electronics PowerTrax 2000</i>	<i>Power Sentry Surge Protector 300 Plus Model 106</i>
<i>Electripak 6SSU</i>	<i>Proxima ProLine 30</i>
<i>GC Electronics Power Management System 64-631</i>	<i>SL Waber Surge Sentry DL6D</i>
<i>Geist Ultimate SRF-6MO/S</i>	<i>Tripp Lite Isobar 8</i>
<i>General Semiconductor 1206K6</i>	<i>Woods 5623 Surge Suppressor</i>
<i>Inland 3 Mode Surge Protector</i>	<i>Zero Surge ZS1800</i>
<i>Innovative Technology SPIU-6</i>	<i>Surge Eliminator</i>
<i>Jayco Electronics Suppress-All AC-6</i>	Highlights 336
<i>Joslyn Model 1203-03 Surge Suppressor</i>	Editors' Choice 337
	Glossary 338
	Surge Suppressors 340
	From Power Plant to PC:
	How Power Travels 344
	Summary of Features 348
	Performance Tests 354

PROGRAMMING

Utilities



BY JOHN DEURBROUCK Keep Indispensable Applications Handy with TOTOP363

Lab Notes



BY ANDREW SCHULMAN Accessing the Windows API from the DOS Box, Part 3379

Environments

BY CHARLES PETZOLD MCI, MIDI, and the Nature of Time395

Power Programming



BY RAY DUNCAN The Windows 3.1 ToolHelp DLL, Part 3 ..399

Databases



BY SAL RICCIARDI Tighten up your negative-number parentheses in FoxPro405

Languages



EDITED BY SHARON TERDEMAN Add a Soundex routine to your BASIC programs for improved string searching407

SOLUTIONS

Advisor

BY JOE SALEMI Using PC Magazine's MultiBoot Utility with DOS 5.0; identifying unnecessary files on your hard disk419

Tutor

BY JEFF PROSISE A simple modification makes DISKCOPY sound a beep when disks need changing423

User-to-User



BY NEIL J. RUBENKING Macros that make it easy to see the properties of a DOS program in Windows; add or remove directories from your PATH without retyping the entire PATH variable427

Spreadsheets



BY CRAIG STINSON Save time and keystrokes in 1-2-3 2.2 with a macro that makes it easy to select a directory437

The Working Word

BY M. DAVID STONE Hold on to your non-standard paper definitions when you upgrade printer drivers451

Connectivity

BY FRANK J. DERFLER, JR. Using 3270 adapters and cable for LAN access; making the safest connection between buildings453

AFTER WORDS

After Hours

•PC sound—in stereo! We review PC speakers from Altec Lansing, Bose, Persona, and Roland.
•Also: EZSound FX, Star Trek 25th Anniversary500

Abort, Retry, Fail?

BILL HOWARD504

ALSO IN THIS ISSUE

Direct Marketing Connection	419
Marketplace	471
Premier	472
Reader Service Card	487
Index to Advertisers	495
Advertisers' Product Index	496
Coming Up	498
Editorial Product Index	499



Is image editing on the PC ready to emerge from the Stone Age? (page 185).



Trekkie treat: Star Trek 25th Anniversary is Interplay's reverent tribute to the classic TV series (page 500).

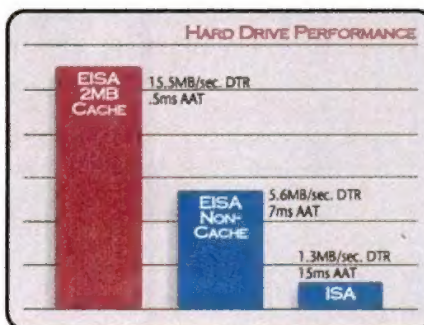
WE OPEN BOTTLE



Tri-WIN 486/EISA Workstation with
17" Display, CD ROM & 250MB Tape Backup.

Tri-Star EISA machines include a 2MB SCSI Cache Controller to maximize your data transfer rate and minimize your average access time. An overall hard drive performance increase of 1500% is realized over ISA-based systems.

"...one of the fastest hard drive performances we've ever witnessed."
—PC Computing, June 1992



Tri-WIN EISA 486 workstations allow you to unleash the hidden power trapped within Intel's 486 processor. With our Intel-based EISA systems, hard disk bottlenecks disappear. Full ISA compatibility is maintained and obsolescence is eliminated. The bottom line? Increased productivity. Better long term value.

An EISA 32-Bit Bus complemented by an EISA 32-Bit SCSI controller with a whopping 2MB cache fully tap today's 486 potential.

All Tri-WIN 486 EISA systems feature burst-mode memory access and a wider bandwidth to memory. An advanced ASIC system board design further enhances reliability and performance. With support for 64MB of RAM on board, dual cooling fans, and 8 half-

height drive bays, future expansion capability is already built-in.

50MHz Power.

With true 32-Bit BUS architecture and true 50MHz processor, Tri-WIN 50MHz 486 EISA workstation defines a new PC performance standard. Offering 50% more

processing horsepower than a 33MHz i486, a 256K secondary RAM cache further boosts Intel's fastest microprocessor. You can always count on Tri-Star to build America's best performance value.



66MHz NOW SHIPPING!



THE RIGHT VALUE



TRI-STAR
COMPUTER CORPORATION

1.800.755-1000

TEL: 602.961.3401

FAX: 602.961.4010

NECKS.



TRI-WIN 486 EISA WORKSTATIONS

FEATURES

Intel EISA True 32-Bit Bus Architecture
32-Bit EISA/SCSI Bus Master Cache Controller with
2MB Cache (Expandable to 4MB)
Maxtor 340MB 12ms SCSI Hard Drive with 64K
Cache Buffer
Intel 80486 Processor with 8K Cache & 487 Math
Coprocessor
8MB of High-Speed 32-Bit RAM (Expandable to 64MB
On-board)
256K of Secondary Static RAM Cache (Expandable
to 512K)
Teac 1.2MB and 1.44MB Floppy Disk Drives
Stealth VRAM Supporting 32,000 Colors & Up To 1280
x 1024 Resolution (Up To 25 Times Faster Than SVGA)
Tri-CAD 17" Flat Screen Color Display with VESA
Standard Refresh
Two Serial Ports & One Parallel Port
Microsoft™ DOS 5.0 & Windows™ 3.1
Logitech™ Mouseman Serial Mouse
Tri-Star 101-Key Enhanced Tactile Keyboard
Deskside Eight-Bay Chassis with Dual Cooling Fans

TRI-WIN
486 50MHZ
\$4495

LEASE \$159/MONTH

TRI-WIN
486 66MHZ
\$4795

LEASE \$169/MONTH

VIDEO UPGRADE

17" FLAT SCREEN NOW STANDARD!

ALL SYSTEMS INCLUDE:

TWO YEAR WARRANTY • ON-SITE SERVICE •
OVERNIGHT PARTS REPLACEMENT • LIFETIME
TOLL-FREE TECHNICAL SUPPORT •
24-HOUR ON-LINE BBS SUPPORT

CIRCLE 121 ON READER SERVICE CARD





Editor-in-Chief Michael J. Miller

Editor Joel Dreyfuss

Executive Editors Bill Howard, Robin Raskin

Director, PC Labs C. James Galley III Art Director David Herbick

Senior Networking Editor Frank J. Derfler, Jr.

Senior Editors Christopher Barr (West Coast), Trudy Neuhaus (Technical Columns), Don Willmott (First Looks)

Managing Editors Diane D'Angelo, Paul B. Ross

Assistant Managing Editor Dianne H. McDonald

Design Consultant Ronn Campisi

Manager, Copy Edit Karen A. Carter Associate Editors Sheryl Canter (Applications Development), Julie Cohen (After Hours), Mary Kathleen Flynn (Trends), David Greenfield (Networking and Communications), Lori Grunn (Graphics), Matthew J. Ross (PCs), Ted Stevenson (Software), Sharon Terdeman (Technical Columns), Jennifer Zaino (Hardware) Technical Editor Neil J. Rubenking Copy Chief Glen Boisseau Becker Staff Editors Michael Cohn, Gayle C. Ehrenman, Angela Gunn, Catherine Kunkemueller, Carol Levin, Michael W. Muchmore, Ann Ovodow, Craig L. Stark, Lance N. Ulanoff Staff Writer Oliver Rist Copy Editors Jeanne Albrecht, Nina Barringer, Robin B. Bornstein, Jamie M. Bsates, Kimberly Lee, Bob Sillery Assistant Copy Editor N. Jeanne Smith Assistant Editors Shari L. Girouard, Ellyn McCasland, Kim Schueler, Emerson A. Torgan Layout Manager Linda Harms Senior Layout Editors Thomas DeVito, Lillian Gaffney Layout Editor Michael L. Graham Librarian Thomas W. Giebel Library Assistant Dolores Williams Editorial Researchers Daniel A. Begun, Eric Berlin, Camille N. Cline, Brad Grimes, Andrew C. Kantor, Susan G. Thomas Editorial Assistant Tim Albano Business Manager Justine Casey Gaeta System Support Manager Craig Ellison Network Administrator Melvin Acevedo Communications Manager Allison Playford Assistant to the Editor-in-Chief Tara Caulfield Assistant to the Editor Rita Aprahamian Assistant to the Executive Editors Christina M. Evelyn Administrative Assistant Christina Okang Interns Meredith M. Gadsby, James Graham

Contributing Editors Bill Machrone (Publishing Director), Douglas Boling, Bruce Brown, Ray Duncan, John C. Dvorak, Mitt Jones, Michael J. Mefford, Edward Mendelson, Bill O'Brien, Charles Petzold, Alfred Poor, Jeff Prosser, Sal Ricciardi, Winn L. Rosch, Joe Salemi, Jim Seymour, Richard Hale Shaw, Barry Simon, Luisa Simone, Craig Stinson, M. David Stone, Gus Venditto, Ethan Winer, William F. Zachmann

Support Associate, PC MagNet Louise Laberge Sysop, PC MagNet Ken Hipple

Associate Art Directors Charles Conover, Donna Panagakos, Lisa A. Sergi Graphic Artists Simone Blank, David Foster, Robin L. Malik Assistant to the Art Director Frieda T. Smallwood

Technical Directors Rick Ayre (Software), Nick Stam (Hardware) Project Leaders Richard Brady (Networking and Communications), Jonathan Hill (PCs), Jeff Mace (Graphics), Stephen W. Plain (Applications Development), Michael J. Zulch (Hardware) Sr. Programmer Stuart R. Greenberg Programmer Bradley G. Epranian Product Testing Manager Charles Rodriguez Tech. Analysts Mario Baldasserini, Jimmy Beltran, Richard Fisco, Margaret A. Piemonte, Amarendra Singh Support Technicians Thomas M. Amoroso, Laura Cox, Carolyn Falconer, William P. Flanagan, Constantine Fotopoulos, Dan Smith Operations Manager John R. Delaney Inventory Control Coordinators Peter Bastide, Rob Graydon, John Jones Administrative Assistant Angela M. Collins

Publisher Jeff Ballowe

Marketing Director Ellen Atkinson Events Stacy O'Connell Market Information Michael Van Engen Sales Development Jeff Stanley Subscriptions Charles Mast Single-Copy Sales James E. Gerth

Senior Advertising Production Manager Vicki Egan Root Advertising Production Manager Lori Iaccino Assistant Advertising Production Managers Pamela Berkowitz, Oris D'Amil Editorial Production Coordinators Kevin S. Fagan, Jo-Ann Hirschel

Advertising Offices: One Park Ave., New York, NY 10016; 800 33 MAG AD, 212-503-5100

Subscription Problems: 800-289-0429, 303-447-9330 (outside the U.S.)

Ziff-Davis Publishing Company

Chairman and CEO Eric Hippeau

President J. Scott Briggs

Executive Vice Presidents Ronni Sonnenberg, Mike Edelhart

Group Vice President J. Samuel Huey

Group Vice President, Worldwide Direct Publications Jim Stafford

Senior Vice President, Marketing Paul H. Chook

Senior Vice President Rachel Greenfield

Vice Presidents Baird Davis (Operations), Howard D. Skolnik (Controller), Herbert Stern (Creative Services), Marian O. White (Research), Bert Lacy (Circulation), James F. Ramaley (Circulation Services), Ann Pollak Adelman (Marketing Services), Roger Herrmann (Production), Rayna Brown (Human Resources), Frank Kelcz (Europe), Alan Power (Asia-Pacific), Bill Machrone (Technology), Paul Stafford (Central Advertising Sales), William L. Phillips, Claude P. Sheer Vice President and General Manager Louis B. Dotti Executive Director, Information Systems John Hellwell National Managing Director, Magazine Networks Joseph Gillespie Directors Steven Rosenfield (Business Development), Jeff Weiner (Corporate Development), Susan Delman (Corporate Marketing), Alicia Marie Ivans (Direct Marketing Programs), Lewis D'Vorkin (Editorial), Jean Lamensdorf (Licensing), Gary A. Gustafson (Planning), Walter J. Terlecki (Production), Gregory M. Jarboe (Public Relations), Dan Leonetti (Sales Training), Beth Springer (Ziff-Davis Labs) Business Manager, Publishing Operations Tom McGrade Assistant to the Chairman J. B. Holston

Ziff Communications Company

Chairman William B. Ziff, Jr.

President Philip B. Korsant

Executive Vice Presidents Philip Sine, E. C. Prokopis

Senior Vice President Hugh Tietjen

Vice President, General Counsel, and Secretary J. Malcolm Morris

Vice President, Controller, and Treasurer Patrick J. Burke, Jr.

Vice President, Human Resources Frederick K. Staudmyer

Vice President, Business Manager T.L. Thompson

Vice President, Chief Information Officer Thor Olson

Vice President, Electronic Editorial Director Michael Kolowich

Vice Presidents Seth R. Alpert, Steven C. Feinman

Subscription Inquiries, Address Changes

Subscription Services: For subscription service questions, address changes, or ordering information, call toll-free 800-289-0429 in the U.S. and Canada; all other countries, please contact Ireland: 353-61419457 or fax 353-61419457. Or write to *PC Magazine*, P.O. Box 54093, Boulder, CO 80322-4093.

Subscription Rate: The subscription rate is \$44.97 for a one-year subscription (22 issues). Canada and all other countries, please add an additional \$32.00 for postage. GST Registration Number: R-123669673.

Back Issues: For back issues (subject to availability), \$8 per issue (\$9 outside the U.S.), send check or money order to Back Issues Dept., Ziff-Davis Publishing Company, P.O. Box 53131, Boulder, CO 80322-3131.

How to Contact the Editors

We welcome letters. However, we cannot look up stories from past issues, recommend products, or diagnose problems with your PC by phone. Send your written questions, complaints and compliments to PC Magazine, One Park Avenue, New York, N.Y. 10016. Please include a daytime telephone number. Send electronic mail to MCI Mailbox 157-9301 or to PC MagNet (see below). PC Magazine's general number is 212-503-5255. The West Coast Operations number is 415-378-5500.

If you are dissatisfied with a product advertised in PC Magazine and cannot resolve the problem with the vendor, write (do not call) Julie Eigo, Advertising Department at the above address. Include copies of your correspondence with the vendor.

PC Magazine does not accept unsolicited manuscripts. We will pay \$50 for Solutions and Programming user tips and for Abort, Retry, Fail? submissions. If you submit artwork or newspaper clippings with Abort, Retry, Fail?, mark up the photocopy, not the original.

PC MagNet

PC Magazine operates PC MagNet, an on-line service of ZiffNet, hosted by CompuServe. To join, set your communications software for 300, 1,200, 2,400, or 9,600 bits per second (bps), 7 data bits, even parity, 1 stop bit, and full duplex. To find the number nearest you, dial 800-346-3247. (In Canada, dial 800-635-6225, voice only.) When the modem connects, press Enter. At the Host Name prompt, enter PHONES. Follow the menus, note the number closest to you, then hang up and dial the number you have just found.



To obtain the utility without ZiffNet connect charges, at the HOST NAME prompt, enter CIS. At the USER ID prompt, enter 60116.1. At the PASSWORD prompt, enter PCMAGUTIL. To join ZiffNet, at the Host Name prompt, enter CIS. At the USER ID prompt, enter 177000,5000. Enter PC*MAGNET at the PASSWORD prompt and Z11D9200 at the ENTER AGREEMENT NUMBER prompt. CompuServe members may join by typing GO PCMAG at any CIS prompt. For Customer Service, call 800-848-8990. ZiffNet membership is \$2.50 a month, which includes access to PC Magazine Editors' Choice Awards, Product Reviews Index, weekly news from PC Week, Buyers' Market, and ZiffNet Highlights and Information. Hourly connect charges are \$6.30 for 300 bps, \$12.80 for 1,200 or 2,400 bps, or \$22.80 for 9,600 bps.

Permissions, Reprints

Material in this publication may not be reproduced in any form without permission. If you want to quote from an article or use PC Magazine's logo in conjunction with an Editors' Choice designation, write Chantal Lavelanet; for information on reprints in quantities of 500 or more, write Claudia Crichlow.

PC Magazine Reviews

Except where noted: All PC Magazine reviews are of currently available products. Benchmark and performance tests are run on Compaq Deskpro 386/25s and 25e's.

Editorial and Business Office: One Park Ave., New York, NY 10016. Editorial: 212-503-5255; Advertising: 800 33 MAG AD, 212-503-5100. PC Magazine is an independent journal, not affiliated in any way with International Business Machines Corp. IBM is a registered trademark of International Business Machines Corp. Entire contents copyright ©1992 Ziff-Davis Publishing Company, a division of Ziff Communications Company. All rights reserved; reproduction in whole or in part without permission is prohibited. The following are registered trademarks of Ziff Communications Company: PC, PC Magazine, PC Labs, PC MagNet, PC Magazine Award for Technical Excellence, PC Magazine Editors' Choice Award. The following are trademarks of Ziff Communications Company: Abort, Retry, Fail?; Connectivity; Databases; Direct Marketing Connection; First Looks; New and Improved; Advisor; Lab Notes; PC Marketplace; Pipeline; Trends; Tutor; The PC Utilities; Power Programming; Power User; Read Only; Spreadsheets; User-to-User; The Working Word.



ROCKS AROUND THE CLOCK



Powerful 386/SX25 Notebook

Up to 4 Hours Operation • 35-Hour Suspend Mode • Fast Charge Batteries • Powerful 386SXL Processor Running at 25MHz
2MB RAM (Expandable to 8MB) • 60MB Hard Drive • Built-In Trackball • 9.4" Super Twist LCD Display with 32 Levels of Gray
1.44MB Floppy Drive • Universal AC Adapter • 8.5" x 11" x 1.9" • Only 6.2 lbs. with Battery, 4.9 lbs. without Battery

A U S T I N

PLUG THIS ROCKET IN A SOCKET.

486/DX2-66 With Local Bus Video Really Takes Off!

Intel's 'clock doubler' 486 DX2-66 processor runs at 66MHz and offers the highest performance on the market for DOS, Windows and OS/2. Includes built-in 8K cache and coprocessor. Our Local Bus Video connects directly to the CPU's bus, and communicates at the CPU's bus speed (33MHz). Up to 15 times faster than a standard ISA video controller. Makes Windows fly!

- High Performance Local Bus Video
- 210MB Hard Drive • 4MB RAM • 128K Cache
- 14" 1024x768 Non-Interlaced VGA Color Monitor
- Enhanced 101-Key Keyboard • 1.2MB and 1.44MB Floppy Drives • One Year GE™ On-Site Service
- DOS 5.0 and Microsoft Windows 3.1 Pre-Loaded

\$2990



Performance



Award-Winning 486/33 WinStation

- Intel i486 Processor running at 33MHz
- 4MB RAM, 64K RAM Cache
- 210MB IDE Hard Drive
- Windows Accelerator Card with over 32,000 colors
- 14" 1024 x 786 Non-Interlaced VGA Color Monitor
- Enhanced 101-Key Keyboard
- 1.2MB and 1.44MB Floppy Drives
- One Year GE On-Site Service
- DOS 5.0 and Microsoft Windows 3.1 Pre-Loaded

\$2290



**"Most bang
for the buck!"**

"The Austin 486/33i WinStation packs a lot of performance and expansion into a compact package. It is attractive, aggressive and affordable."

PC Magazine Contributing Editor Wim L. Rosch

A U S



386/SX-33 WinStation	486/SLC-25 WinStation	386/33 WinStation	486/DLC-33 WinStation	486/33 WinStation
386SX, 33MHz w/16K Cache 2MB RAM (to 16MB) 40MB Hard Drive 14" VGA 640x480 Color Monitor w/256K Video RAM 1.44MB & 1.2MB Floppy Drives 101-Key Keyboard DOS 5.0/Windows 3.1 Mouse Small Footprint Chassis	Cyrix 486SLC, running at 25MHz 2MB RAM (to 32MB) 80MB Hard Drive 14" VGA 640x480 Color Monitor w/256K Video RAM 1.44MB & 1.2MB Floppy Drives 101-Key Keyboard DOS 5.0/Windows 3.1 Mouse Small Footprint Chassis	Intel i386, 33MHz w/64K Cache (to 128K/256K) 4MB RAM (to 32MB) 80MB Hard Drive 14" VGA 640x480 Color Monitor w/256K Video RAM 1.44MB & 1.2MB Floppy Drives 101-Key Keyboard DOS 5.0/Windows 3.1 Mouse Small Footprint Chassis	Cyrix 486DLC, 33MHz w/64K Cache (128K/256K) 4MB RAM (to 32MB) 120MB Hard Drive 14" VGA 640x480 Color Monitor w/256K Video RAM 1.44MB & 1.2MB Floppy Drives 101-Key Keyboard DOS 5.0/Windows 3.1 Mouse Small Footprint Chassis	Intel i486, 33MHz w/64K Cache (to 256K) 4MB RAM (to 32MB) 210MB Hard Drive 14" VGA 1024x768 Non- Interlaced Color Monitor w/Windows Accelerator 1.44MB & 1.2MB Floppy Drives 101-Key Keyboard DOS 5.0/Windows 3.1/ Mouse Small Footprint Chassis
\$1290	\$1390	\$1490	\$1690	\$2290
486/DX2-50 WinStation	486/50 WinStation	486/DX2-66 WinStation	486/DX2-80 EISA WinStation	386/SX25 Notebook
Intel i486DX2 running at 50MHz w/64K Cache (to 256K) 4MB RAM (to 32MB) 210MB Hard Drive 14" VGA 1024x768 Non- Interlaced Color Monitor w/Windows Accelerator 1.44MB & 1.2MB Floppy Drives 101-Key Keyboard DOS 5.0/Windows 3.1 Mouse Small Footprint Chassis	Intel i486 running at 50MHz w/64K Cache (to 256K) 4MB RAM (to 32MB) 210MB Hard Drive 14" VGA 1024x768 Non- Interlaced Color Monitor w/Windows Accelerator 1.44MB & 1.2MB Floppy Drives 101-Key Keyboard DOS 5.0/Windows 3.1 Mouse Small Footprint Chassis	Intel i486DX2 running at 66MHz w/128K Cache (to 256K) 4MB RAM (to 32MB) 210MB Hard Drive 14" VGA 1024x768 Non- Interlaced Color Monitor w/Windows Accelerator 1.44MB & 1.2MB Floppy Drives 101-Key Keyboard DOS 5.0/Windows 3.1 Mouse Small Footprint Chassis	Intel i486DX2 running at 50MHz w/128K Cache (to 256K) 8MB RAM (to 32MB) 210MB Hard Drive 14" VGA 1024x768 Non- Interlaced Color Monitor w/Windows Accelerator 1.44MB & 1.2MB Floppy Drives 101-Key Keyboard DOS 5.0/Windows 3.1 Mouse Small Footprint Chassis	386SX running at 25MHz 2MB RAM (to 8MB) 60MB Hard Drive 9.4" VGA LCD Display, 640x480 w/ 32 gray scale 1.44MB Floppy Drive Built-In Track Ball 79-Key Keyboard Optional DOS 5.0/ Windows 3.1 6.2 lbs. with battery
\$2490	\$2590	\$2790	\$3190	\$1690

Five More Reasons To Buy Austin

- 30-Day Money-Back Guarantee
- Free, One-Year, On-Site Service from GE 
- Expert Technical Support, 24 Hours-A-Day
- Novell Gold Authorized Reseller 
- Five PC Magazine Editor's Choice Awards 

SEE US AT BOOTH #3249
NETWORK 92
OCTOBER 12-15 • DALLAS
DALLAS CONVENTION CENTER

We accept ACS and all major credit cards—and C.O.D.

AUSTIN
COMPUTER SYSTEMS
10300 Metric Blvd., Austin, TX 78758

FAX 1 (512) 454-1357
Canada 1 (800) 338-1565
Overseas 1 (512) 339-3500
Networking 1 (800) 874-7182

1(800)752-1577
24-HOURS-A-DAY

© 1992 Austin Computer Systems. All Rights Reserved. Other product names or trademarks shown herein are for illustrative purposes only and may be the property of other companies. Prices and specifications are subject to change without notice. Austin Computer Systems cannot be responsible for errors in typography or photography. There is no annual fee or minimum charge required for the Austin Computer Systems credit card and the annual percentage rate is 17.99%. GE on-site service is not provided on notebooks.

CALL FOR
OUR LATEST
TELEPHONE
SPECIALS!

T

I

N

CIRCLE 012 ON READER SERVICE CARD

PC-AA-3



**FOR GOING PLACES
AND DOING THINGS.**

What happens when you do a great job? Somebody, somewhere wants you to do even more. And WordPerfect® Works is the single, simple-to-use set of programs that will help. It'll let you quickly turn out persuasive memos with colorful graphics. Track inventories with a very cooperative database. Crunch spreadsheet numbers like a pro. And fax the whole package right from your PC to Paris, London, or the warehouse in Waukesha. All while saving you disk space, laptop batteries, and tension headaches. With everything it offers, WordPerfect Works is only \$159. With our limited-time competitive trade-up offer, it's only \$89 (\$110 CAN). So get yours today. Because no matter where you're going, WordPerfect Works can get you there faster.



**OR DOING THINGS
AND GOING PLACES.**

WordPerfect® Works

WORDPERFECT IS A REGISTERED TRADEMARK AND WORDPERFECT WORKS IS A TRADEMARK OF WORDPERFECT CORPORATION WITHIN THE UNITED STATES AND OTHER COUNTRIES. ALL OTHER BRANDS AND PRODUCT NAMES ARE TRADEMARKS OR REGISTERED TRADEMARKS OF THEIR RESPECTIVE COMPANIES. © WORDPERFECT CORPORATION 1992

FOR INFORMATION CALL 1-800-526-5017

**Score This Season With
Super Savings From Acma!**



"Acma's 50MHz 486DX is the Ultimate Windows Machine"

Computer Shopper August, 1992

ACMA 486-33i

Intel™ 486-33MHz processor
Internal math-coprocessor & 8K cache
256K external static RAM cache
4MB RAM expandable to 32MB
Teac 1.2MB & 1.44MB floppy drives
240MB IDE hard drive
MAG 15" Super VGA color monitor
Orchid Pro Designer IIs with 1MB.
2 serial, 1 parallel, and 1 game port
Supports Weitek math-coprocessor
101-key enhanced keyboard
DOS 5.0, Windows 3.1, & Glossary.
High-resolution serial mouse
Novell, Unix, Xenix & OS/2 Compatible.
One year TRW on-site service.

\$2,395



ACMA 486-50i

Intel™ 486-50MHz processor
Internal math-coprocessor & 8K cache
256K external static RAM cache
4MB RAM expandable to 32MB
Teac 1.2MB & 1.44MB floppy drives
240MB IDE hard drive
MAG 15" Super VGA color monitor.
Orchid Pro Designer IIs with 1MB.
2 serial, 1 parallel, and 1 game port
Supports Weitek math-coprocessor
101-key enhanced keyboard
DOS 5.0, Windows 3.1, & Glossary
High-resolution serial mouse
Novell, Unix, Xenix & OS/2 Compatible.
One year TRW on-site service.

\$2,795



**"EXEMPLARY SUPPORT
AND SERVICE."**



**THREE TIME BEST-BUY
WINNER!**



**"POWER BEYOND YOUR
DREAMS."**



"THE ONES TO WATCH."



**"ROUND THREE'S
WINNER."**

YOU GET MORE AT ACMA!

45-Day Money-Back Guarantee ~ One Year Parts And Labor Warranty ~
One-Year TRW On-Site Service ~ Lifetime Toll-Free Technical Support ~
24-Hour BBS Service ~ 48-Hour High-Temperature Burn-in ~ Certified
Microsoft Compatible ~ Novell, Unix, Xenix & OS/2 Compatible ~ Leasing.

CALL TOLL-FREE 800-786-6888

Open 6am-7pm Weekdays and 8am-4pm Saturdays (PST)
24-Hour Fax 510-623-0818, Corporate 510-623-1212



1992 Acma Computers Inc. 48501 Warm Springs Blvd. Fremont, CA 94539. Prices & specifications subject to change without notice. 45-day money-back guarantee covers Acma computers with Impression or Hyundai monitors, software, printers, peripherals, and shipping not included. Acma is not responsible for errors in typography or photography. Call to confirm complete details before ordering. Limited one-year P&L warranty. All symbols or names are trademarks and/or registered by their respective companies.

CIRCLE 360 ON READER SERVICE CARD

Letters

EYE OF THE BEHOLDER

Are you guys blind or what? Not only is your new format ugly, ugly, ugly, but it is impossible to distinguish the articles from the advertisements. Maybe that's what you wanted to do, but I think it's a big mistake.

Mark Kielar
San Francisco, California

I hate the new format of your table of contents. It resembles a bad three-page ad. The old format permitted you to open the magazine and ascertain at a glance what you wanted to read first. In the new format, the overly large and fussy typeface, the highlighting, the boxes, and the three pages make a quick read virtually impossible. Send the "clothes" back to the tailor.

David W. Emmons
Chicago, Illinois

The Edsel, the United States Football League (USFL), "New Coke," and now we can add the redesign of *PC Magazine* to the list.

Geb Buxton
Washington, D.C.

Okay, so who's the bozo that decided on the format and type change? Let us see the whites of his eyes! Your magazine is no longer as readable, nor is the copy as distinguishable from the ads. If it ain't broke, don't fix it.

Matt Douglas
Sheridan, Indiana

YOU LOOK MAAHVELOUS!

Congratulations on the redesign of *PC Magazine*. I think it looks fine: no big surprises, only subtle changes, and the table of contents is easier to use than it was previously. This is what a layout design should provide.

Jay Trowne Smith
San Francisco, California

I just received your July 1992 issue, and I wanted to comment on the new format. Keep it! The graphs were much easier to interpret, not to mention easier on the eyes. One of my coworkers liked



"I just wanted to comment on the magazine's new look...."

it so much he asked for the subscription card.

George Sansing, Jr.
Jackson, Mississippi

In general, I like your new format, and I must particularly commend you for finally ditching the 3-D benchmark charts. They were next to impossible to read.

Stephen M. Dunn
Toronto, Ontario, Canada

I applaud the new look and feel of *PC Magazine*. I find it more readable and—dare I say it—user-friendly.

Oscar W. Smith, Jr.
Norfolk, Virginia

Five stars to the new look: clean, crisp, electronic! Hats off to you for a job well done.

Jim Duarte
Plainville, Massachusetts

LESS THAN PERFECT?

"Selecting the Perfect PC" (July 1992) fell short by failing to suggest the best computer option currently available, the Amiga 3000.

It's the only computer that doesn't require a memory manager, and it doesn't slow to a crawl if you run a GUI. Most

importantly, you don't need a second mortgage to finance it.

Gary Metzendorf
Marietta, Georgia

Are you nuts? Why are you telling people that they should be equipping their file server with a VGA card and monitor? VGA serves no purpose whatsoever on a file server. Monochrome is the best setup because of its low cost, simplicity, and minimal power consumption.

Please remember: What does a file server do? It serves files. To that end, only hardware that widens or accelerates the flow of data will enhance the performance of a file server.

Kevin R. Pierce
Mountain View, California

Your July cover story was the most informative and comprehensive article on PC systems that I've read. However, there is one thing that was not very clear. You state that a 64K four-way set-associative cache is often about as effective as a 256K direct-mapped cache. You also state that 486DX/50s have previously benefited from a 256K cache, though a 64K cache was generally enough for a 486/33.

Is this statement made based on two-way set-associative, four-way set-associative, or direct-mapped cache?

Robert Eldridge
Glenside, Pennsylvania

• **Most of the 50-MHz 486-based PCs tested by PC Magazine Labs have contained 256K of direct-mapped processor RAM cache. Similarly, the 33-MHz 486s usually contained 64K of direct-mapped RAM cache.—Ed.**

Bravo! Your July issue's cover story is the most comprehensive, understandable, and technically apt treatment of the whole spectrum of PC hardware I have ever seen. I learned quite a bit from your step-by-step approach to breaking down hardware choices.

Please do your best to make this feature an annual event. A comprehensive rundown of the state of the art every year

OKIDATA USES LIGHT TO MAKE YO

If you think all laser printers are mirror images of each other, meet the one that broke the mirror.

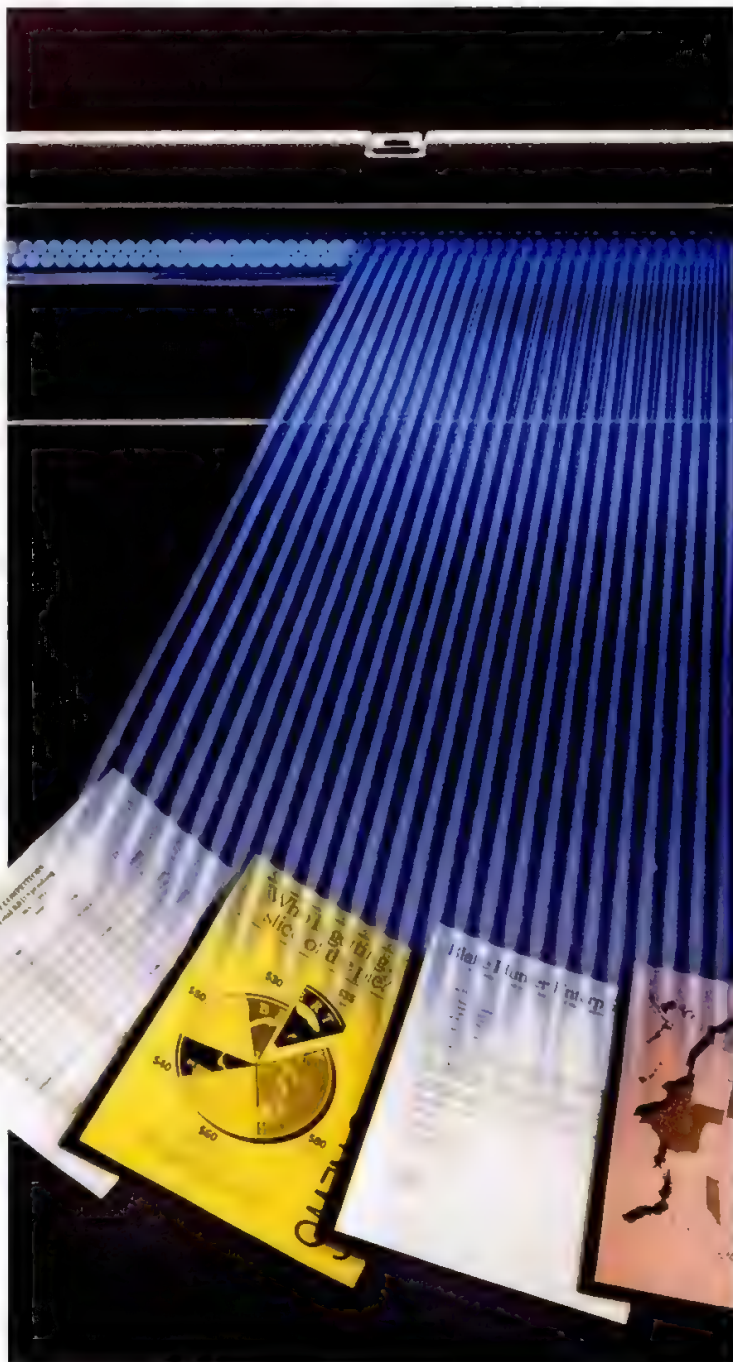
Okidata engineers flatly rejected the complex mechanism of rotat-

**OUR BRILLIANT LED PRINTER
LINE-UP INCLUDES THE NEW,
IMPROVED-RESOLUTION
OKIDATA OL810.**

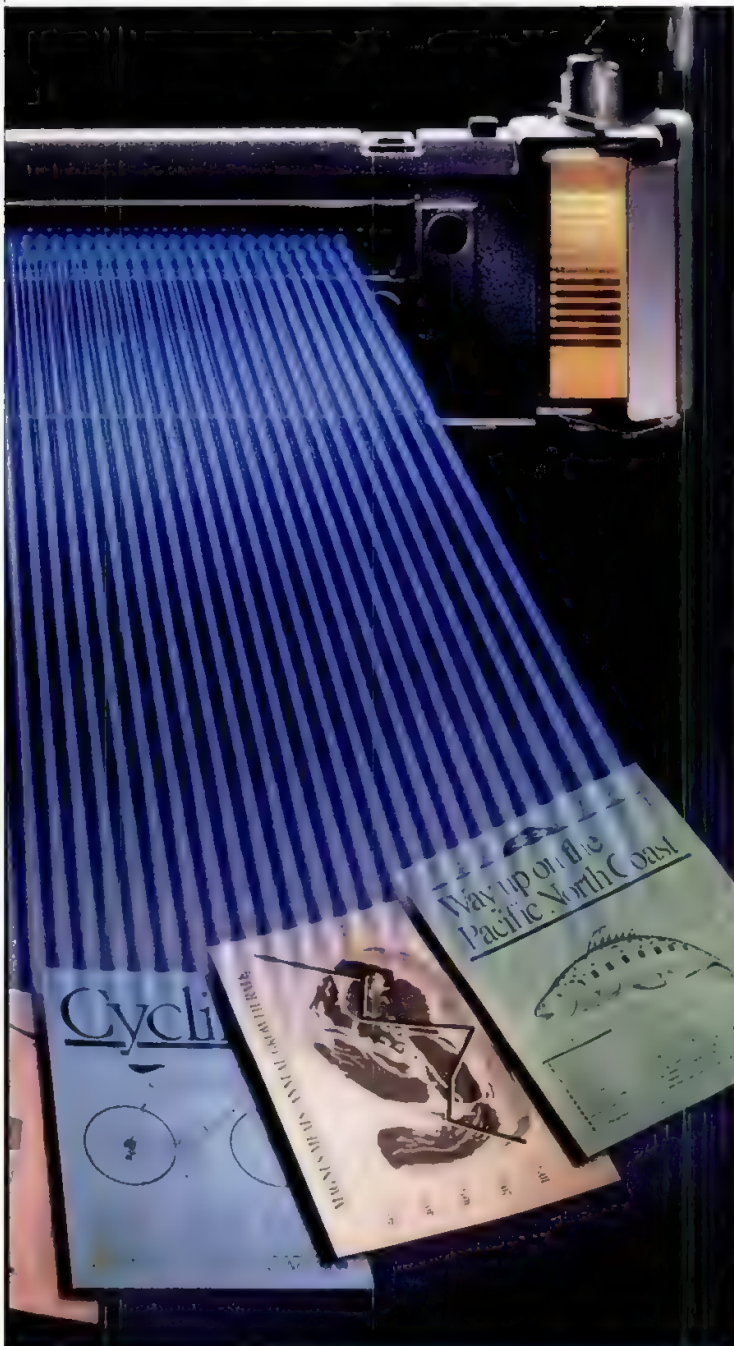
*ing mirrors,
focusing
lenses and
whirring
motors that
every
major*

*brand of laser printer depends
on for its operation.*

*Instead, they designed a
better way – a unique,
solid-state LED printhead that
precisely positions each one of
2,560 pinpoints of light, to pro-
duce a laser printer's brilliant
output without a laser printer's*



2,560 BURSTS OF U' LOOK BRILLIANT



built-in complications.

•
Since our solid-state LED print-head has no moving parts, Okidata guarantees it for five full years—the industry's longest. (After all, our printers have a reputation of reliability to uphold.) And we offer a full range of machines that can handle any workload from basic word processing to sophisticated business text and graphics.*

•
To see how Okidata page printers can help make your business look brilliant, call 1(800)OKIDATA for the name of the dealer nearest you. And look brilliant yourself.



IT'S GOT TO BE THIS GOOD TO BE OKI OK!™

CIRCLE 235 ON READER SERVICE CARD

LETTERS

is extremely useful and would be a great help to us all.

Jeff Cadieux
Houston, Texas

In your July 1992 issue you state that you get roughly the same image size on a 14-inch monitor at VGA resolution, a 17-inch monitor at Super VGA, and a 19-inch monitor at 1,024-by-768 resolution ("Monitors: Match Screen Size to Resolution"). This is true if one uses the standard VGA Windows fonts.

However, if the 8514 system fonts are used for 1,024-by-768 resolution, it is not true. Your graphic on page 212 clearly shows that you don't need a 17-inch monitor to run Windows with 1,024-by-768 resolution effectively.

Terrence Layne
Columbus, Ohio

LOOKS TOO MUCH LIKE A REVIEW

After reading about ten pages of what I thought was an unbiased review of OS/2 in July's *PC Magazine*, I noticed that the top of every page said "Special Advertising Section" with the word "Advertising" partially obscured by the OS/2 logo. It was obviously designed to capture people, just as it caught me. I wonder how many others read the article thinking it represented the trusted reporting of *PC Magazine*.

This is deceptive on IBM's part, and it erodes your journalistic credibility.

Tom Quinn
St. Paul, Minnesota

I find very objectionable the 16-page advertisement masquerading as editorial material. To trick people into reading an advertisement by making them think it is editorial material is unethical. I hope that in the future, you will not accept advertisements of this nature.

Walter J. Parsons
Walnut Creek, California

• The OS/2 supplement was designed by an outside consultant. Any visual similarity between the supplement and our new design was purely coincidental. We're sorry you found this confusing.—Ed.

HUNTING AND PECKING

The standard desktop keyboard was imposed on us by IBM and copied by almost everyone. Those of us who use portables and desktops must constantly switch from one layout to another.

Isn't it time that desktop computers offer portable-style layouts as an option?

Constantino Grosse
San Miguel de Tucuman, Argentina

WHEN YOU WISH UPON A STAR...

Michael Miller's wish list for easier software installation in your July 1992 issue got me thinking about an old favorite, the

*Michael Miller's wish list
for easier software
installation got me
thinking about an old
favorite, the original
Sidekick.*

original Sidekick. It meets many of Miller's criteria, including selective installation, keyboard shortcuts, and customizable menus.

The most amazing point is that the program is seven or eight years old. Who needs these bloated new software packages? Michael Miller's wish list was fulfilled years ago.

Drew Boswell
Greensboro, Georgia

MEMORY LAPSE?

I read with interest "A Guide to Memory Management" in your July 1992 issue. I was surprised to find no mention of the number-one-selling memory management book—*Managing Memory with DOS 5*, by Dan Gookin—included in the suggested-reading sidebar.

It's hard to understand how such a cornerstone reference was overlooked in the research for this article. Your magazine has always been fair in its product reviews and recommendations. That fairness should extend to computer books as well.

Michael Halvorson
Microsoft Press
Redmond, Washington

WORDPERFECT IS TOO PERFECT

I can't remember when it first started, but *PC Magazine* has been giving WordPerfect its Editors' Choice awards for years now. Although it's an excellent product, I feel that it is a professional writers' tool.

Most users merely need to type letters and don't need cumbersome functions that eventually allow them to accomplish the task.

Zen Miller
Tempe, Arizona

UNAPPROACHABLE

Your July issue was packed with fascinating material. Nevertheless, I would like to point out a problem with one of the software products you mentioned. The ecstatic First Looks review of Approach, which prompted me to buy the package, notes that it "allows only one view per window. But you can switch between reports and forms of the same view in a single window." This is not a sufficiently clear statement of the program's inability to make multipage forms and reports. Moreover, your review fails to mention that fields in reports are fixed in their position, so that anything that does not appear on-screen will not be printed.

Anthony F. Janson
Apex, North Carolina

CORRECTIONS AND AMPLIFICATIONS

OptLink was incorrectly credited to PocketSoft (First Looks, May 26 1992). The actual vendor is SLR Systems (415-282-0864).

In the Letters column of June 16, 1992, a correspondent incorrectly stated that tax preparation software is not deductible. It is deductible.

HOW TO WRITE TO PC MAGAZINE

We welcome your comments and suggestions. Please send correspondence to Letters, *PC Magazine*, One Park Ave., New York, NY 10016, or upload it to PC MagNet (see page 12 for access information). All letters become the property of *PC Magazine* and are subject to editing.

CorelDRAW 3.0!

The first ALL-IN-ONE business graphics solution!

In the information-packed '90s, good graphics are more important than ever to get your message across quickly and effectively. And now it's easier than ever to use graphics – with CorelDRAW 3.0! **Everything you need is in one value-packed box.** There is no longer any need to buy separate illustration, charting, painting, and presentation packages now that CorelDRAW 3.0 does it all with **unmatched power and ease of use!**

And, as an **unprecedented bonus**, Corel has included a CD-ROM with over **14,000 clipart images** and over **250 fonts!** You'll get fingertip convenience for software that would otherwise occupy over 500 floppy disks and cost thousands of dollars. It's **incredible value** for the price – and Corel has made it easy for you to experience the **exciting power** and effectiveness of **super graphics.** That's why we put it all in one box!

NEW

CORELDRAW!

The world's #1 illustration package with even more power

- Powerful text handling: includes 250 TrueType fonts
- Creative freedom: live blends, enveloping, 3D extrusions
- Precision and power: unlimited layers, snap-to objects
- Easy to use: online help, exciting interface innovations

NEW

CORELCHART

Powerful and versatile data-driven charting and pictographs

- Great looking charts & pictographs: quickly and easily!
- True 3D charting: with powerful manipulation options
- Wide range of chart types: from bar to 3D to pictographs
- Powerful data management: DDE links or import from popular packages

NEW

COREL PHOTO-PAINT

Photo retouching and bitmap creation

- Powerful tools: create stunning bitmapped pictures
- Automatic retouching filters: edit scanned or Kodak® Photo CD pictures
- Color control: work in black & white and 24 bit color
- Easy to use and versatile

NEW

COREL SHOW

The easiest way to create a presentation

- Powerful document integration: bring all your OLE information together
- Easy slide show creation: play animated flicks too!
- Free run-time player: anyone can view your presentations even without CorelDRAW

DRAW IT!
CHART IT!
PAINT IT!
SHOW IT!

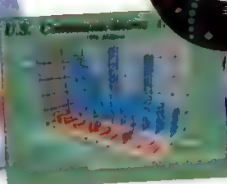
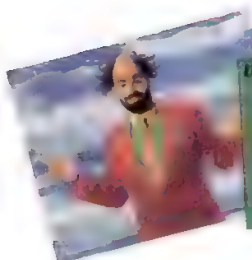
"CorelDRAW is a phenomenal bargain!"
PC/Computing
Michael Burgard
July 1992

ONLY \$595
Suggested list price

PLUS CorelMosaic, CorelTrace, Corel Screen Capture, and bonus CD-ROM!

IT'S EASY!
CORELDRAW!

3.0



1-800-836-DRAW

FAX: (613)761-9176 • CDTEL: (613)728-8290

24hr FREE HOTLINE SUPPORT

CorelDRAW is MULTIPLATFORM for corporate standardization:
Windows, OS/2, UNIX. And soon available on the MAC and in 21 languages!



ZEOS[®] '486

Now, You can unleash ZEOS '486 EISA

THE ZEOS '486 EISA

"ZEOS...performed best on our tests, and they offer the best overall packages."

**—PC Magazine,
Editors' Choice**

"ZEOS speeds to the head of this pack of EISA systems."

—PC Week

"The ZEOS '486 offers the best choice of all!"

—Computer Shopper

"Outstanding."

—PC Magazine

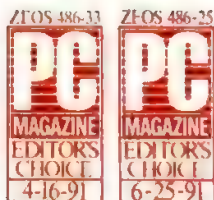


EISA!

Power. Editors' Choice!

NEW
LOWER
PRICE!

"A MUST FOR THE CORPORATE USER" — PC MAGAZINE



In awarding your new ZEOS '486 the coveted *Editors' Choice Award*, *PC Magazine* said the ZEOS '486 EISA was "best on our tests." They went on to note the ZEOS '486 is "both surprisingly useable and affordable." But that really shouldn't come as a surprise. After all, this ZEOS '486 powerhouse comes from a family of *nine* ZEOS Editors' Choice machines. Now let's talk real '486 power:

THE POWER OF EISA

It begins with the EISA bus. *PC Magazine* found that the 32-bit EISA bus when combined with our EISA disk caching controller will provide performance "easily twice as fast (and occasionally ten times as fast) as an AT-bus computer with the same microprocessor and megahertz rating." Now that's *fast*!

But what about compatibility? While the '486 processor offers full software compatibility, the EISA bus will accept your present eight- and sixteen-bit expansion cards and runs them without a hitch. That's the advantage of the EISA bus. Incredible performance with complete compatibility. That's your new ZEOS '486 EISA.

"TWEAKING AND REFINING:" A ZEOS HALLMARK.

And, speaking of performance. In their *Editors' Choice* review, *PC Magazine* noted "ZEOS has a reputation for tweaking and refining that shows." That's the ZEOS way.

Unleash the power! Unleash your own ZEOS '486 EISA. *PC Magazine* calls it "out-standing." If it's your first '486, you will quite likely call it unbelievable. Believe it.

Attention to detail really makes the difference. We're talking about important details, items you may not even notice at first. Like two cooling fans in EVERY ZEOS '486. And cabinets loaded with drive bays. Loaded too with our high-capacity power supply and a motherboard that will take up to 32MB right on board. And more.

"SUPERLATIVE SERVICE AND SUPPORT"

"Superlative Service and Support." That's what *PC Magazine* calls ZEOS's 24-Hour-a-Day Toll-Free Sales and Technical Support program. We're here any time you need us—day or night.

And that's only the start of your ZEOS Customer Satisfaction package. Add to it our 30-Day Absolute Satisfaction Money-Back Guarantee, One Full Year Limited Warranty and our Express Parts Replacement Policy. You're going to be very satisfied. We don't just say it. *We guarantee it!*

ORDER YOUR ZEOS '486 EISA TODAY!

PC Magazine says the ZEOS '486 is "a must for the corporate user." Corporate or otherwise, the ZEOS *Editors' Choice* '486 EISA is the one for you. So why not pick up the phone and give us a call right now? Your own expert Systems Consultant is waiting here to help you tailor your new ZEOS '486 EISA just as you want it. Your absolute satisfaction is *Guaranteed!*

CALL NOW TOLL FREE

800-423-5891

DON'T FORGET THE OPTIONS!

ZEOS has them all. Starting with blazing 32-bit EISA cards and every other high-performance option you could possibly want. On-site service is available too. Call 800-423-5891 for details.

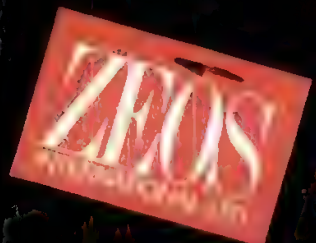


THE COMPLETE
ZEOS 486-33MHz
EISA DESKTOP!
128K CACHE, 107MB
DRIVE & MORE.
ONLY \$2595

- 486-33MHz CPU with built-in cache and math coprocessor.
- High-speed 128K SRAM secondary cache.
- 8-32 bit EISA expansion slots. Also accepts 8-bit and 16-bit cards.
- 1MB of high-speed RAM, expandable to a total of 32MB.
- Ultra-fast 107MB IDE hard drive, choice of 1.2MB or 1.44MB Teac® floppy drive.
- Genuine Hercules® graphics controller. 14" high-res amber display with Tilt/Swivel base.
- ZEOS/RS 101-key Space-Saver keyboard.
- ZEOS I/O Card with two high-speed serial plus parallel & game port.
- Full Wattek® math coprocessor support.
- Rugged ZEOS 7-bay desktop case with high-capacity power supply and two cooling fans for increased component life and system expandability.
- Wrap it all up with 24-Hours-a-Day, 365-Days-a-Year Toll-Free Technical and Sales Support on your ZEOS Hotline. You've got a winner!

ORDER NOW TOLL FREE
800-423-5891

Fax Orders Dial: 612-633-1325
Government: 800-245-2449
GSA #G500K91AG55176
TDD (Hearing Impaired) Orders
Call: 800-228-5389
Outside US and Canada Call:
612-633-6131
MasterCard, VISA, Discover,
Am Exp, Z-CARD, COD and
Leasing Programs.
Open 24 Hours a Day,
365 Days a year!

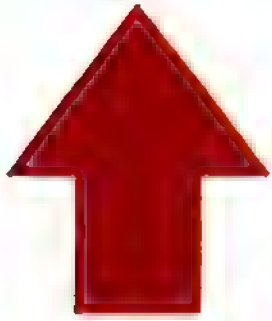


Purchase orders from Fortune 1000 companies, governments and institutions subject to approval. Leasing programs available. All prices and specifications subject to change without notice. Please call to confirm pricing, specification and warranty details. The following are trademarks of their respective corporations: ZEOS and Z-Card of ZEOS International Ltd. © 1992, ZEOS International Ltd., 530 5th Avenue, N.W., St. Paul, MN 55112 USA. ZEOS is a publicly traded company NASDAQ symbol: ZEOS BA4E-PCM-920929

CIRCLE 063 ON READER SERVICE CARD

Even at 17" there's no room for improvement.

Or, as *PC Week*[®] so nicely put it, "NEC's MultiSync 5FG is the best PC monitor we've ever seen."^{*}



If you want to see the big picture, look to NEC. We make the best products for windows computing. In fact, both the MultiSync 5FG monitor and Silentwriter[®] Model 95 printer were rated best in category and chosen as part of the ideal Windows PC by PC Computing magazine.

Wide open windows. Our FullScan[™] capability delivers sharp images edge-to-edge with no black border. So you'll have ample room for more than one usable window. In fact, our flat square screen provides one of the largest active display areas of any 17" monitor."^{**}

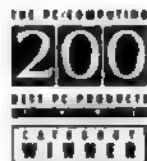
Exceptional clarity. The polished, high-contrast screen surface provides improved focus and enhanced color vibrancy. So even six-point, single-pixel fonts are legible and details are crystal clear. Dual dynamic beam focus ensures consistent focus across the entire screen. And with higher refresh rates, you'll see rock-solid, flicker-free images.

Standard extras. A second generation microprocessor and memory with digital controls automatically optimizes screen geometry. Our Reduced Magnetic Field[™] technology means all FG[™] monitors meet MPR II standards. Of course, the 5FG is compatible with PC and Mac[®] II/Quadra[™] systems and most workstations. The 5FG supports all major video standards from VGA to 1280 x 1024 non-interlaced at 74 Hz. And only NEC has the amazing AccuColor[™] color manipulation system.



Any way you measure it, the MultiSync[®] 5FG is a superior monitor. For more information, call 1-800-NEC-INFO. (In Canada: 1-800-343-4418.) For immediate info via fax, call NEC FastFacts[™] 1-800-366-0476, request #1741.

Because  is the way you want to go. **NEC**



Art and the Seafarer GALLERY

Complete information

Historic Ships in Miniature

Exquisite, museum-quality reproductions of ships from the age of sail are the ultimate acquisition for the discerning collector. These one-of-a-kind, historically accurate, scale wooden models faithfully recreate every detail of the original vessel and make impressive display pieces for the home or office. Choose from our collection of completed models or commission one of our builders to model the ship of your choice.



Portside Amidships Detail

Model:
Challenge
Type:
Great Lakes
Centerboard Schooner
Launched:
Manitowoc, Wisconsin 1856
Scale:
3/16" = 1 foot
Builder:
Robert L. Evans
Appraised Value:
\$8,500



NEC

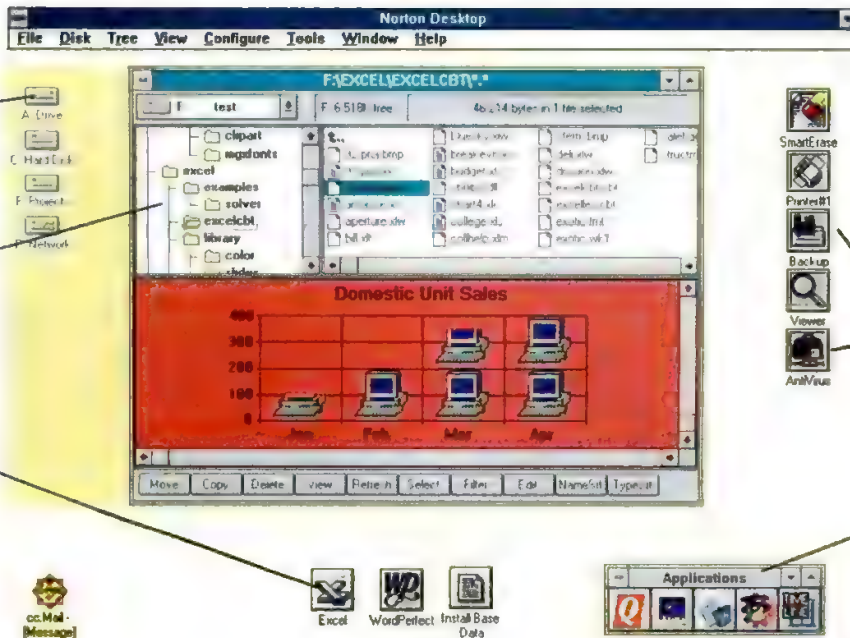
MultiSync 5FG

NORTON DESKTOP FOR WINDOWS SAVES TIME, MONEY, ENERGY, AND DATA.

With Norton Desktop for Windows, your drive icons sit right on the desktop, so you get direct access to your files.

Click on a drive icon for easy file management. The drive window includes a tree pane, file pane, and a customizable button bar with a view option.

For total convenience, applications or files can be dragged onto the desktop for easy access. Open files effortlessly with a quick mouse click or, by dragging the file to the application.



The Norton Desktop is a completely integrated environment. You can drag-and-drop files from the drive window to a tool, drive icon, application, or onto the desktop itself.

All the utilities you need to backup, protect, and repair your data sit right on your desktop. You can drag files or drive icons directly to the tool you need.

Keep your favorite applications in a handy customizable toolbox. Launch the application easily with just a click of the mouse.

That's a package full of savings. Norton Desktop for Windows 2.0 enhances Windows in all the important ways. It helps you work faster, smarter, and with better results.

Saves Time.

Something you don't have a lot of. We've improved file management, placing drive icons right on the desktop, so you get immediate access to all your files and applications. Speed search, button bar, viewer, customizable fonts, and collapsible tree structure are all designed to save you time. Full drag-and-drop allows you to drag applications and files out of the drive window to anywhere on the desktop so you have instant access to them.

Saves Money.

We all know time is money. And because Norton Desktop looks so much like Windows, you won't have to waste time learning how to use it. You get most everything you need to run your PC in one comprehensive package—a great, money-saving value.

"Norton Desktop for Windows 2.0 is still one of the best productivity tools you can buy."

—PC Computing, 5/92

Saves Energy.

Because Norton Desktop can be easily customized, you invest your energy in your work, not in trying to figure out how to get it done. Customizable auto-load frees you from reloading applications that you use daily. And, SuperFind™ allows you to locate "lost" files, across networks or in the background.

Saves Data.

Lost or corrupted data can cost you time, money, and energy. The selection of utilities in Norton Desktop helps you maintain your data. Virus protection and repair, automatic backup, and data recovery can be easily accessed from the desktop; or, scheduled to run unattended, or in the background. Plus, they support all major networks. Norton Desktop for Windows 2.0 is just \$179.00 (S.R.P.) at your dealer. Or, call 1-800-554-4403 for an instant FAX Data Sheet (enter 450). ** The sooner you get it, the sooner you'll save.



SYMANTEC.

Windows Starts a Family

But are there too many members?

As Democrats and Republicans loudly debate which party is better qualified to talk about the family, Microsoft has quietly snatched up the term to describe its long-term Windows strategy. If Microsoft's campaign succeeds, there will be a member of the Windows

family running on everything from hand-held consumer devices to mainframes.

PC users may find the family model new and confusing, at least initially, but people who have worked in mainframe and mini-computer environments may find themselves more at home with the concept. As David Thacher, Microsoft's group product manager for Windows NT points out, DEC had a lot of success using this kind of approach with VMS, the operating system that runs its VAX mini-computers. "The alternative would have been like a Swiss Army knife," he argues. "But then you give everybody a bunch of things they don't want. With the family model, you get only what you need."

According to Microsoft's current thinking, in the desktop business market there are four sets of user needs. The company has product plans for each of them: Windows 3.1 for personal productivity (shipped in May of this year), Windows for Workgroups 3.1 for group productivity

(scheduled for early 1993), Windows NT 3.1 for power users and application servers (due by year's end), and LAN Manager for Windows NT 3.1 for network administrators (also due by year's end).

But figuring out which product will satisfy your needs may be more challenging than Microsoft believes. It may well be a no-brainer to choose between Windows 3.1 and

Continues on page 32

Windows Family: Step by Step

LAN Manager for Windows NT 3.1

Available: Late 1992 **Price:** More than \$500

Adds advanced network management tools (such as RAID 5, drive duplexing, and disk mirroring). Aimed at administrators of large multiserver networks

Windows NT 3.1

Available: Late 1992 **Price:** Less than \$500

Adds preemptive multitasking, full 32-bit support, C2-level security, and advanced networking features (such as DCE-compatible RPCs and support for TCP/IP). Aimed at power users and servers.

Windows for Workgroups 3.1

Available: Early 1993 **Price:** Less than \$300

Adds file and print sharing, mail, and scheduling. Aimed at small workgroups. Will become the high-volume seller as users move to networks

Windows 3.1

Available: Now **Price:** \$149

Basic product, foundation of the family. Aimed at today's mainstream standalone-desktop user. Today's best-seller

PDAs Require Special CPUs

UNLESS YOU REMEMBER THE COMMUNICATORS from the original Star Trek television series, personal digital assistants (PDAs) won't be like any computer you've ever seen. In fact, they will be so different they'll require unique low-powered processors like the ARM 610 and AT&T's Hobbit chip.

The Hobbit and ARM CPUs are small, low-cost RISC chips designed for palm-size computers. They are low-voltage, fully 32-bit chips with static cores that let them operate with extremely low power requirements and still remember what they're working on. AT&T is targeting pen-based communications devices to handle personal faxes and e-mail.

Apple is racing EO Computer and General Magic to be the first to deliver a PDA. Apple's Newton, which uses the ARM 610, is expected to sell for less than \$1,000. EO Computer and General Magic will use the Hobbit CPU.

Since these new chips are not being produced by Intel, the chips won't support DOS or Windows when they're first made available. Instead, Newton will run the Newton OS (which is incompatible with Macintosh), and GO is working with AT&T to modify GO's PenPoint, which will run on the EO Computer and General Magic PDAs.

Intel recently realized the error of its ways and licensed the 386SL code to VLSI Technology for a PDA-specific chip. But fruits of that deal aren't expected for a year—long after the first PDAs grace our palms.—Christopher Barr

Managing Calls

CALLER ID, THE CONTROVERSIAL phone service that allows subscribers to see the number and (in some instances) the name of the person calling, is already revolutionizing call-management products. But will the service itself survive?

On Windows, there's WindowPhone, a \$295 call-management tool from AG Com-

Pipeline By Gus Venditto

Next Generation of Smart Super VGA Boards

In recent months, if you wanted to get a faster Windows than Windows on a VGA system, you could do it by spending a few hundred dollars more for boards based on first-generation acceleration technologies from ATI, Chips and Technologies, S3 Corp., Texas Instruments, Tseng Laboratories, and Western Digital. Right now, competition is heating up in the second generation of SVGA boards, which should be hitting the market this fall. Once these products are established, the first-generation boards will come to represent the entry level. Tseng has been a major player in the first generation with its economical ET-4000, the controller inside Compaq's ProLinea line and the Diamond Computer SpeedSTAR. The ET-4000 is a low-rent solution. Unlike its competitors, it doesn't have any display functions built into hardware. Tseng got a major stake in the premium Super VGA market because it had the most efficient controller back in 1989.

Last year, ATI, S3, and Western Digital eclipsed the ET-4000 in performance, though their boards were usually more expensive because they built common graphics functions into the hardware. S3 became the name to look for because it was found in a wide variety of boards (the Diamond Stealth VRAM and the Orchid Fahrenheit 1280', for example), while ATI's accelerators are available only in ATI products such as the Graphics Ultra.

In the second generation, with the ET-4000-W32, Tseng will aim to provide the low-cost solution while adding common raster operations to hardware. S3 will try to expand its reputation for speed with three distinct chips, some providing hardware-assisted acceleration with DRAM, others aiming at top performance with 24-bit color.

ATI will also provide 24-bit color in its newest device, the 68800. And for the first time, ATI will license the hardware to system makers, so the technology will be more widely available than in the past.

These are not the only players in the field. Weitek, for example, was one of the first companies to offer hardware-assisted video acceleration, but its performance didn't measure up. This time, Weitek has high hopes for its Power 9000 chip, which uses much the same logic that Weitek has sold for Sun workstations.

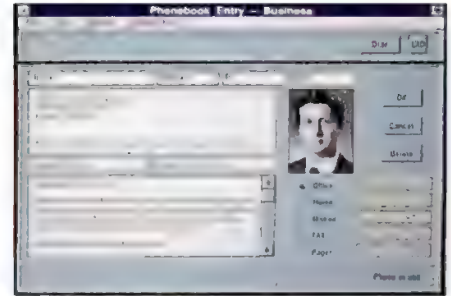
At this stage, the companies can't provide real products for testing in the lab, but they're all boasting about the results of prototypes. This much is clear: While the first generation of SVGA accelerators had Graphics Winmark scores between 3 and 9 million, second-generation boards will be scoring between 15 and 30 million. Right now, ATI and Weitek seem to have the edge in raw speed. S3 may have some dazzling innovations; let's just hope the company doesn't sacrifice speed along the way.

Gus Venditto is a contributing editor to PC Magazine and the editor of PC Sources.

munications Systems Corp. (800-424-8559). WindowPhone users get a pop-up screen when there is an incoming call that identifies the caller by name and phone number. With a mouse click, the user opens a file containing information on the caller including address, phone numbers, personal notes, and even a picture—all before the user picks up the phone. WindowPhone automatically logs the call's date, time, and duration while users maintain notes on their conversation. It also logs unanswered phone calls—even if the computer is turned off. And

WindowPhone includes features to manage outgoing calls, which makes the product useful in areas of the country not yet equipped with Caller ID service.

Similar to WindowPhone but DOS-based is Caller ID+Plus (\$195), from Rochelle Communications (800-542-8808). Caller ID+Plus functions in much the same way as WindowPhone, adding a history of previous calls to caller profiles. Unlike WindowPhone, however, the PC must be turned on and Caller ID+Plus must be loaded into memory to function.



With WindowPhone, you can even see a picture of the person calling you.

These products are most useful to sales people, who could easily look up customer histories. But other small-business users—lawyers, whose telephone conversations with clients are usually billable, and doctors, who can access a patient's medical history even before answering a call—stand to gain, too.

Ultimately, the benefits of these packages will depend on how well Caller ID is accepted. Not everybody thinks the service is a great idea. Companies like Untraceable Phone Calls (617-784-9015) sell services to neutralize Caller ID (for \$2 per minute, a phony phone number is displayed). State governments are also beginning to pay more attention to privacy advocates. Massachusetts and Pennsylvania have already outlawed the service, and North Carolina and Ohio require telephone companies to offer a free blocking service. California and Maryland require phone companies to offer blocking on a per-call basis, and other states have caller ID legislation still pending.

—Brad Grimes

Downsizing Front-End Processors

IN A NEW TWIST ON DOWNSIZING, front-end processors (FEPs)—those hulking pieces of iron that handle mainframe communications—will soon toss out their proprietary processors and use standard Intel PC chips instead.

Starting this September, server vendor Tricord Corp. and network integrator Memorex-Telex will replace their FEPs with Tricord's powerful 486-based Super Server. The new FEP, dubbed the 8600 series, will enable network managers to migrate from the proprietary systems that popularized FEPs to an Intel-based platform, which should yield significant long-term cost savings.

The 8600 will integrate both PC-based

local area network and mainframe communications. It will route IPX and TCP/IP packets and will connect directly to the host through a channel or SDLC line. Memorex-Telex is also integrating an SNA gateway onto the server, but the company declined to identify the manufacturer. In its first incarnation, the 8600 will work with IBM's line of 3000 and 4000 mainframes. Entry-level pricing is expected to start at \$30,000.

The 8600 will likely face stiff competition from router vendors such as Cisco and Wellfleet, who are aiming their routers at a similar market. However, Memorex-Telex expects that by using a single hardware platform for communications, file service, and application service, the company will provide a greater level of network integration and usability than competitors.

—David Greenfield

Top Retail Software

Current ranking	Last issue	Product/Company
1	2	WordPerfect 5.1 for DOS WordPerfect Corp.
2	5	QEMM-386 6.0 Quarterdeck Office Systems
3	3	Microsoft Windows 3.1 Microsoft Corp.
4	4	Microsoft DOS 5.0 Upgrade Kit Microsoft Corp.
5	7	WordPerfect 5.1 for Windows WordPerfect Corp.
6	15	Lotus 1-2-3 2.4 Lotus Development Corp.
7	6	Stacker 2.0 Siac Electronics
8	8	Excel for Windows 4.0 Upgrade Microsoft Corp.
9	1	Microsoft Windows 3.1 Upgrade Microsoft Corp.
10	10	Procomm Plus 2.1 Datastorm Technologies
11	13	Quicken 5.0 Intuit
12	11	OS/2 2.0 Upgrade IBM Software
13	12	Word for Windows 2.0 Microsoft Corp.
14	9	Word for Windows 2.0 Upgrade Microsoft Corp.
15	—	FastBack Plus 3.1 Fifth Generation Systems

The list ranks PC business programs according to the total number of copies shipped to stores and resellers in the week ending July 25, 1992. The list is based on shipments to more than 12,000 retail locations. It does not include sales made directly by software publishers and cannot be interpreted as a picture of the entire software market. Sales information compiled by Ingram-Micro.

How to Sell Your Old PC

WHEN A CORPORATE PC USER buys a new system, the old machine usually gets passed down the line to someone else on staff. But how can small businesses and individual users get the best value for their old PCs, especially in this age of rapidly falling prices for both new and used computers?

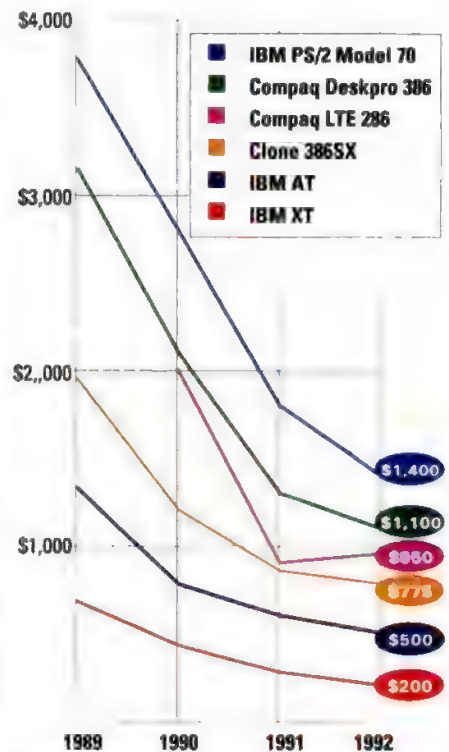
Your best bet may be to enlist the help of a brokerage firm such as the American Computer Exchange (formerly the Southern Computer Exchange, 800-786-0717), the Boston Computer Exchange (800-262-6399), the Computer Exchange Northwest (206-820-1181), the National Computer Exchange (212-614-0700), or the Western Computer Exchange (505-265-1330), to name the best-known ones.

For sellers, there are several advantages to using a broker. "One mistake we see sellers make is to overprice their systems," says John Hastings, president of the American Computer Exchange (AmCoEx), which charges a 10 percent commission. "Sellers are thinking about what they paid for the system when they bought it. But they need to think about what people are paying today. Because we have an up-to-date database, we can help sellers price their systems more realistically," he explains. And, says Hastings, "If you use a broker, you won't have to support the sale. Because you're anonymous, you won't get phone calls six months later if the hard disk fails."

For buyers, a brokerage firm may inspire more trust than an individual seller. "We provide a margin of safety," says Dye Hawley, president of the Computer Exchange Northwest, which charges a 15 percent commission (15 percent is the standard; AmCoEx's 10 percent is an exception). As with most exchanges, Northwest places the buyer's check in "sort of a mini-Escrow account for a couple of days," explains Hawley. "That gives the buyer time to get the local PC repair shop to run a diagnostic test," which costs between \$20 and \$50, depending on where you live. AmCoEx goes even further, getting the system in-house and checking it out before shipping it to the buyer.

If you're selling your system, another resource that may help is a \$39 book called *How to Buy and Price a Used Computer*, from Orion Research, which also publishes the \$129 *Orion Computer Blue Book*, an annual used-computer pricing guide for dealers (800-748-1984).

Used PCs: Cheaper than Ever



Source: American Computer Exchange

If you're excited by the falling prices of new PCs, take a look at the incredible bargains that used systems offer.

And if you're shopping for a used computer, the best news is that you should find many 386DX systems selling for well under \$1,000. —Mary Kathleen Flynn

Stop that Thief

NOTEBOOKS APPEAL TO LEGIONS of buyers because they're light, powerful, and transportable. But that same appeal makes them easy prey for thieves. While a stolen \$2,000 notebook will earn only \$200 for the thief, it can mean a loss of valuable data for the victim of the theft.

Until now there hasn't been a method to secure a notebook to a desk without the chain getting in the way, but MicroSaver from Kensington Microware and NoteGuardian from PC Guardian let you chain your notebook to a desk as you would a bicycle to a pole.

They work by wrapping a metal cable around, say, a desk leg, then inserting a metal fitting at the end of the cable into a special slot on the notebook (no, not the floppy disk slot). Both products use a slot

Trends

built into the case by the notebook manufacturer. When the lock is closed, the notebook is secured to the desk.

If someone tries to steal it, they'll either be discouraged or they'll destroy the notebook case in the process, making it practically worthless.

Security is only possible when notebook OEMs build the security slot into the case. Compaq decided corporate travelers wanted to keep their machines and built the slot into the LTE/Lite series. Toshiba plans to include the security slot in its entire line, beginning with new products released later this year, and AST is putting it into a future notebook design. —*Christopher Barr*

Give It a Rest

LAWSUITS FILED BY SUFFERERS OF the wrist disorder carpal tunnel syndrome against Apple, AT&T, DEC, and IBM are bound to make manufacturers pay more attention to ergonomics when designing the next generation of products. In the meantime, a few products already on the market can help you take care of yourself.

User Friendly Exercises is a \$59.95 package developed by FingerTip Info, a division of Technically Innovative Computer Accessories (800-274-8422), and distributed by PM Ware (619-738-6633). At regular inter-

vals, User Friendly Exercises reminds you to take a brief break from work: the DOS version emits a low-frequency tone, and the Windows version automatically pops up.

The TSR provides simple exercises designed to reduce back pain, eye fatigue, and hand and wrist damage. The exercises are demonstrated on screen by a model; the graphics are primitive but easy to follow.

EyerCise from RAN Enterprises is a similar product (800-451-4487). The \$69.95 package runs on Windows and OS/2. Like User Friendly Exercises, it enforces periodic rest breaks that include stretches and eye training exercises.

Another utility that can improve the physical comfort of computing is Display-Mate, a \$149 package available from Sonera Technologies that can help you reduce eye-strain (800-932-6323). The package uses a series of test patterns to evaluate the performance of your monitor and video card. It makes suggestions about fine-tuning your display.

These days, most companies that sell office furniture and computer accessories are targeting customer concerns about the work

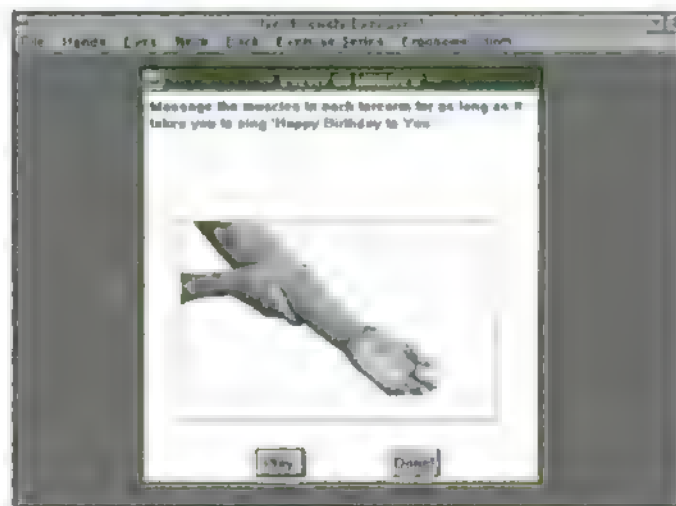
environment. At least one company specializes in ergonomically sound products: Ergosource Inc. sells arm rests, wrist risers, glare screens, and just about anything else

that will make you more comfortable while you work (800-969-4374).

And if you're really serious about preventing carpal tunnel syndrome, you can buy Omnitech Research Corp.'s Omni-Flexor, a device that helps develop all six motion ranges of the wrist.

With a list price of \$225 (and a street price around \$150), it is sold primarily to doctors (800-582-4131).

—*Mary Kathleen Flynn*



User Friendly Exercises reminds you to take frequent breaks to exercise.

Windows Offspring

CONTINUED FROM PAGE 29

LAN Manager for Windows NT 3.1 (after all, you know whether or not fault tolerance means anything to you). But how do you know if your department will be content with Windows for Workgroups (with file and print sharing, mail, and scheduling), or if you would be better off getting the more powerful Windows NT 3.1 (with more networking and better security)? Or maybe you should go all the way and get LAN Manager for Windows NT 3.1 (with tools for the network administrator)?

The saving grace may be that the Windows family is made up of incremental steps—Windows NT, for example, includes Windows 3.1 and Windows for Workgroups. So if you decide you need more advanced features later, you won't have lost anything by choosing the lower-end product to start out with. And Microsoft has promised that upgrade products (with traditional upgrade prices) will be smart enough to leave your current Windows setup alone when you install them.

Over time, these decisions are bound to become easier, especially when Microsoft clarifies the extent to which each product will implement key strategies such as the Windows Open Services Architecture (WOSA) and Cairo (a new object-oriented environment under development). Still, some users may decide Microsoft's message is just too complicated. For them, IBM's one-size-fits-all approach for OS/2 may prove the simpler solution.

—*Mary Kathleen Flynn and Robin Raskin*

Briefs

IBM IS EXPECTED TO TAKE CENTER

stage this fall when it announces some dramatic moves, but Big Blue has already begun to make some minor program changes. The company signed up a direct-mail distributor: USA Flex, which is selling the IBM PS/2 L40 SX laptop directly to end users for \$1,299 (800-872-3539). IBM is also promoting the 20 MHz laptop (which is being replaced by a 25 MHz 386SLC-based model) on cable TV's Home Shopping Network.

WINDOWS USERS WHO WANT TO WATCH

QuickTime movies don't have to wait for Microsoft and Apple to deliver a QuickTime player for Windows. CoSA's PACo multimedia compression and playback system lets you run QuickTime movies under Windows today. The Multimedia Package is \$399 (401-831-2672).

THE MOST POPULAR SCSI HARDWARE

now comes with the most comprehensive SCSI software. Adaptec's new SCSI Plus Interface Kits include CorelSCSI, a set of drivers claimed to support every SCSI device on the market (408-945-8600).

TO ENCOURAGE CUSTOMERS TO DONATE

its software to charities and schools, WordScience Corp. includes two copies of its new \$99 Instant Definitions dictionary in every box (510-939-1190). The company also encloses an envelope to Gifts In Kind America, which will forward the extra product to a worthy recipient and give you a tax deduction.

MEN AND WOMEN VIEW THEIR

computers very differently, according to *The Logitech People and PCs Poll*. A free copy of the study is available (510-795-8500).

—*Mary Kathleen Flynn*

Complete ZEOS® PC.

Only 1.3 lbs!

INDUSTRY-STANDARD SOFTWARE IN AN INCREDIBLY PORTABLE PCI

Imagine a portable PC that lets you send and retrieve your e-mail, modem a memo to the home office, write reports, create spreadsheets, manage your calendar, calculate your expenses... *work non-stop for ten hours*... and is so portable that it weighs about the same as a notepad.

A futuristic fantasy? Not unless the future is now. It's the ZEOS Pocket PC, and only ZEOS has it! You're going to love how portable and affordable it is. In fact, we think you'll find it's the one PC you'll want to take with you everywhere!

COMPACT YET COMPLETE. 1.3 lbs!

At only 9 1/2" x 4 1/2" and only 1.3 lbs., what's great about the ZEOS Pocket PC is that it has a keyboard you can really use. If you're accustomed to typing with both hands, switching to a palmtop PC can be awkward because the keyboard only lets you type with one hand or even one finger. Yet the ZEOS Pocket PC's keyboard lets you use both hands easily, so you won't sacrifice comfort and speed for portability.

And even though it's small, the ZEOS Pocket PC carries a *full suite of industry standard software* already loaded and ready to go! You get *Microsoft DOS 5.0* system files with built-in file transfer and *Microsoft Works 2.0* with word processing, spreadsheet, database and communications programs. Plus, you get a personal organizer which includes a calendar/planner, "to do" list, business card file, information retrieval (for country codes, converting measurements and currency) and more. It's everything you need to manage your life!

IT JUST KEEPS GOING...

Ten hours of continuous use? Absolutely! All it takes is the two AA alkaline batteries included with your system. And your ZEOS Pocket PC has great power management, too—it automatically switches to the suspend mode when you take a break. Plus, when you turn off your system, then turn it on again, it goes right back to where you left off. What a time-saver!

STAY IN TOUCH.

Modem a memo to a client; send and retrieve your e-mail. With the Pocket PC's optional

fax/modem, you can communicate worldwide. Plus, expanding the memory is another easy

option—with an additional memory card that slips right into a slot on the system's underside. And that's not all.

ZEOS. #1 RATED NOTEBOOKS.

PC Magazine, in their recent Service and Reliability issue said, "Only ZEOS portable PCs achieved significantly higher-than-average ratings in all four categories." The four categories were *reliability, future purchase plans, repair service satisfaction and technical support*. And remember, ZEOS technical support is 24 hours a day, 365 days a year, and always toll-free. And we back every ZEOS purchase with our 30-Day Absolute Satisfaction Money-Back Guarantee, One Year Limited Warranty and more.

ORDER YOUR ZEOS POCKET PC TODAY!

So call us today at 800-423-5891. You're going to love the new ZEOS Pocket PC. *We guarantee it!*

CALL TOLL FREE:

800-423-5891

**THE ZEOS
POCKET PC.
ONLY \$595!**

- **CPU:** Industry-standard NEC V30.
- **Memory:** 1MB of RAM and 1.5MB of ROM.
- **Size:** Only 1.3 lbs., 9 1/2" x 4 1/2" x 1 1/2"
- **Power Supply:** Two AA alkaline batteries and 2032 Lithium back-up battery, all included. Ten hours battery life with continuous use, even more in suspend mode!
- **Preloaded Software:** MS-DOS 5.0 system files, Microsoft Works 2.0 (word processing, spreadsheet, database and communications programs) and a personal organizer, planner, to do list, card file, information and calculator.
- **I/O Ports:** One serial, one parallel and two PCMCIA memory card connectors.
- **Carrying case, cables and adapters included.**
- **Power Management:** Automatic transition between active, dose and suspend modes.
- **Screen:** Easy-to-read 7" x 2 1/4", 640 x 200. A true 80 x 25 character display.
- **Keyboard:** 81-key with 12 function keys, embedded numeric keypad and special-function hot keys.
- **Order a Special Travel Kit for only \$249!** Comes with send/receive fax/modem and communications software.

**ORDER NOW TOLL FREE:
800-423-5891**

Fax Orders: 612-633-1325
Government: 800-245-2449
Outside U.S. and Canada:
612-633-6131
Hearing Impaired (TDD):
800-228-5389
MasterCard, VISA, Discover,
American Express, E-Card,
COD and Leasing Programs
Open 24 Hours a Day,
365 Days a Year!

All prices and specifications are subject to change without notice. Please call for current pricing and warranty details. ZEOS is a publicly traded company: NASDAQ symbol: ZEOS. © ZEOS International, Ltd., 530 5th Ave. NW, St. Paul, MN 55112 USA. All products and company names are trademarks or registered trademarks of their respective holders. PF-PCM-920929



The ZEOS® 486SLC-25. A Price-

Now, you can get '486 performance at a '386SX price. Incredible? Yes. Impossible? No! It's the new ZEOS 486SLC-25 and this baby is *hot*. Now you can have our new super-fast, super-loaded ZEOS 486SLC system at the incredible price of only \$1995. There is absolutely nothing else like it.

And when we say loaded, we mean *loaded*! Your new ZEOS 486SLC comes with our non-interlaced 1024x768 color monitor. A Diamond graphics card offering over 32,000 colors. Your choice of two *complete* Lotus Windows software packages, plus MS-DOS 5.0 and Windows 3.1. A Microsoft mouse. And much, much more.

To create the ZEOS 486SLC, we started at the heart with a brand-

new microprocessor from Cyrix®. This hot new chip, with its internal pipeline cache, accesses internal memory with a 32-bit bus. You'll see that the 486SLC-25 delivers more bang for the buck than anything else out there.

You may know Cyrix as the folks who design the unbelievably fast and reliable FasMath™ family of math coprocessors which consistently receive industry accolades. Now

Cyrix has applied their high performance design skills to the new 486SLC CPU. And ZEOS makes it scream!

AND HOW DOES IT PERFORM?

We tested it against a typical 386SX-20 and

a 386DX-33. We tested it again against a 486SX-20. The results? Check out these benchmarks! The ZEOS 486SLC performed nearly

'486 Performance at a '386SX Price.

"...a straightforward, full-size business machine with all the trimmings... delivers fast performance at a 386SX price."

—PC Magazine

"Exemplary for its price ... clearly outdistanced 386SX-based systems..."

—PC Week



Performance Breakthrough!

twice as fast as a 386SX system, about 1.5 times as fast as a 386DX-33, and it was even faster than a 486SX-20! Now this power is yours at the price of a 386SX.

COMPATIBILITY. 100% GUARANTEED.

This new 486SLC microprocessor is 100% compatible with industry standard software. We're so sure of your satisfaction with the compatibility of your new ZEOS SLC-25 that we're adding *yet another* guarantee to the standard-setting ZEOS warranties and guarantees that back all of our products. We guarantee that during the first six months you own your system, if your ZEOS 486SLC-25 does not

work with any of the top 100 selling software titles, ZEOS will replace that PC with a comparable ZEOS 486SX system. And we'll do it absolutely free.

LOTUS BUNDLE: NO ADDITIONAL CHARGE!

Included with your new 486SLC-25 is your choice of two: *Lotus 1-2-3 for Windows*, *Ami Pro* and *Freelance Graphics for Windows*.



Z • S P E E D M E T E R

The Z-Speed Meter reports actual performance differences between these four processor types. Your new 486SLC-25 comes out the winner!

dows. Pick two. Complete and fully-documented—this software alone is worth close to \$1000! Yours from ZEOS, at no additional charge.

FREE TECHNICAL SUPPORT. 24 HOURS A DAY.

Questions about your new system? Call us. Your new ZEOS system is backed by Toll-Free Technical Support, 24 Hours a Day, 365 Days a Year. Plus a 30-Day Absolute Satisfaction Money-Back Guarantee. *Plus* our Express Parts Replacement Policy. You're going to be very satisfied. We don't just say it. *We guarantee it.*

ORDER YOUR NEW ZEOS 486SLC-25 NOW!

Call us now: 800-423-5891. And get the kind of power you need at the price you want to pay: '486 performance at a '386SX price. Only \$1995! Who could resist? Call ZEOS now!

**NOW
pick
two from
Lotus!**

All prices and specifications are subject to change without notice. Please call for current pricing and warranty details. ZEOS is a publicly traded company. NASDAQ Symbol: ZEOS. ©1992, ZEOS International, Ltd., 530 5th Avenue NW, St. Paul, MN 55112. All products and company names are trademarks or registered trademarks of their respective holders. SLC-PCM-920929



CIRCLE 036 ON READER SERVICE CARD

ONLY \$1995!

- Cyrix 486SLC-25 CPU.
- 4MB high-speed zero-wait state 53ns RAM.
- 107MB ultra-fast IDE hard disk drive.
- Teac® 5.25" 1.2MB and 3.5" 1.44MB floppy drives.
- Incredible Diamond SpeedStar Hi-Color VGA graphics card with 1MB RAM and Sierra DAC. Over 32,000 colors!
- ZEOS 14" 1024x768 VGA non-interlaced color monitor.
- ZEOS/RS 101-key SpaceSaver keyboard.
- Two serial, one parallel and one game port.
- 7-16, 1-8 bit expansion slots, math coprocessor support.
- Rugged ZEOS 7-bay SpaceSaver case. 200 watt power supply and two cooling fans for added reliability.
- Microsoft Mouse.
- MS-DOS 5.0 with QBasic.
- Microsoft Windows 3.1 plus your choice of 2 out of 3 Windows applications: Lotus 1-2-3 for Windows, Ami Pro and Freelance Graphics for Windows!
- ZEOS 24-Hour-a-Day Toll-Free Technical Support and complete Customer Satisfaction Package.

Tailor your system...

More memory, an incredible selection of hard drives and virtually any other add-on you could want. Ask about other money-saving packages, too.

ORDER NOW TOLL FREE

800-423-5891

Fax Orders: 612-633-1325

Gov't Orders: 800-245-2449

Outside U.S. and Canada:

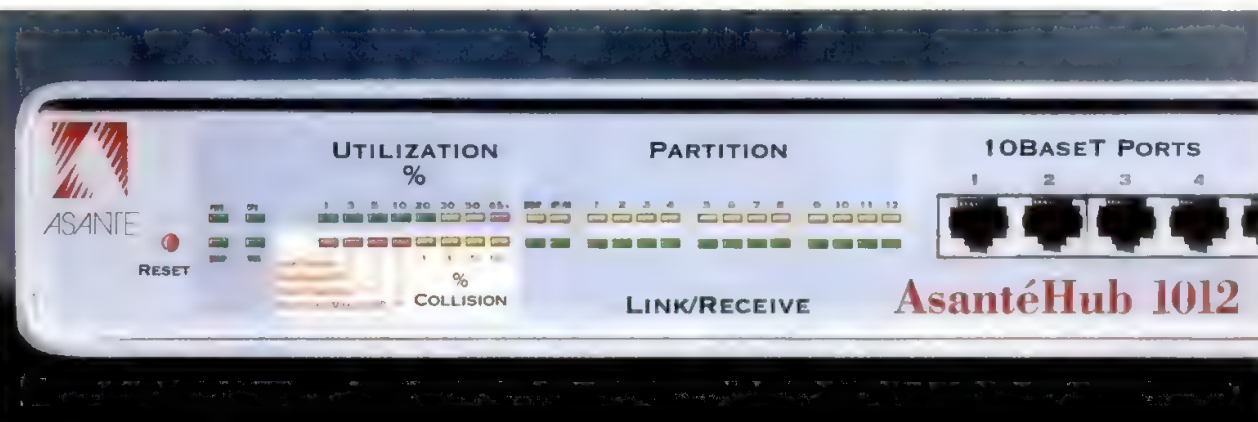
612-633-6131

MasterCard, VISA, Discover, Am Ex, Z-Card, COD and Leasing Programs.

Open 24 Hours a Day, 365 Days a Year!



©1993 Asanté Technologies, Inc. Asanté is a trademark of Asanté Technologies, Inc. All other brand names and product names are trademarks or registered trademarks of their respective holders.



We call it a smart hub. You'll call it a smart choice.

The AsantéHub 1012™ is a 12-port, intelligent 10BaseT hub that offers all the features and benefits of a high-end enterprise hub for a departmental price.

Combining the AsantéHub 1012 and AsantéView™ management software creates the industry's first smart hub with both in-band (SNMP) and out-of-band network management for both PCs and Macs® that uses the same graphical user interface. That means you can graphically monitor and control your entire network, locally or remotely, from your choice of computer platform.

Smart Remote Network Management.

AsantéView gives you direct control of your network at the hub and port levels. The software can even trigger your pager to give you the flexibility to solve your office network problems when you're not there.

The AsantéHub includes a built-in expansion slot for internetworking option cards. Asanté offers an in-band SNMP hardware module as an option for this slot. The hub also features an RS-232 port for remote dial-up access, and both RJ-45 and RJ-21 connectors for direct-to-computer or

punch-down block connections.

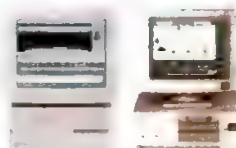
There is also a 3-in-1 "13th" port for interconnecting multiple hubs with backbone cabling. This port includes BNC, RJ-45 and AUI connectors supporting a variety of cabling media.

Asanté. The Smart Choice.

Asanté has built a reputation for producing compatible, reliable and flexible networking products. We offer a full family of Ethernet® and Token Ring adapter cards for PCs and Macs. And a full line of 10BaseT hubs. We're the networking company of choice because we give you more choices.

For more specific smart hub questions, please call us today at 800-523-3115.

Resellers: Asanté products are available from Ingram Micro, Merisel, and Tech Data.



[In-band or out-of-band network management from a Mac or PC, using the same graphical user interface.]



[3-in-1 auto-switching redundant backbone port with software override capability.]



[Remote out-of-band management lets you manage your network from anywhere in the world.]

ASANTÉ™
ALL THE RIGHT CONNECTIONS™

First Looks

HANDS-ON EVALUATIONS OF THE NEWEST SHIPPING PRODUCTS

■ Preview

Quattro Pro for Windows Shows Spreadsheet Smarts

BY CRAIG STINSON

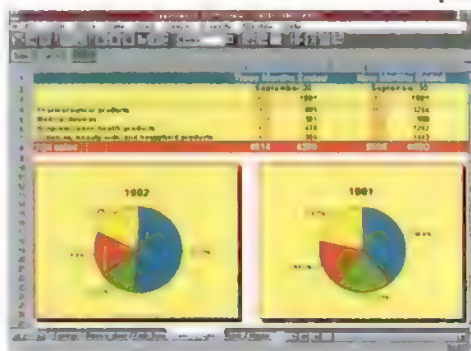
A respectable challenger to Microsoft Excel in the Windows spreadsheet market is about to arrive. After numerous delays, Borland International appeared to be on the verge of shipping Quattro Pro for Windows as this issue went to press.

Judging by still-fragile, late prerelease software, QPW looks as if it will give Microsoft some things to think about. While it lacks many of the conveniences of Excel and some of Excel's analytic sophistication, the \$495 QPW provides an easier transition to Windows for most DOS spreadsheet users, and it incor-

porates a number of very bright ideas that are all its own.

The timing of Quattro Pro for Windows' arrival has become interesting. Borland had hoped to have the product ready much closer to Microsoft's release earlier this year of Version 4.0 of Excel. That didn't happen, but QPW is still expected to beat the delayed Lotus 1-2-3 for Windows, Release 2.0, to store shelves by several months.

For Windows spreadsheet buyers, whose numbers are growing as Windows moves



NEW LEAF: Named page tabs simplify navigation through QPW notebooks.

onto more and more desktops, the market has never been in such a state of flux. Clearly, the days of Excel's virtual mo-

nopoly on the Windows spreadsheet market are over.

DISTINCTIVE FEATURES

The most distinctive features of QPW are its notebook metaphor and its object-oriented approach to just about everything.

A QPW document, called a notebook, consists of 255 row-and-column grids that are called *pages*. Tabs appear along the bottom of the document window, providing fast mouse navigation among pages. The tabs have plain letter names (A to IV) to start, but you can supply descriptive identifiers, and you can use those names in formulas just as you might use range names. A formula transecting pages named East, North, South, and West, for example, might read @SUM(East..West:A1).

As a true three-dimensional spreadsheet, QPW is closer in style to Lotus 1-2-3 for Windows than to Excel, but QPW makes the multipaged worksheet far more usable than does 1-2-3/W.

• *Continues on page 38*

■ Illustration Software

IntelliDraw: An Intriguing Collection of Drawing Tools

BY LUISA SIMONE

Whether it's a Renaissance masterpiece or an electronic org chart, a good drawing must be based on an inherent visual logic. IntelliDraw, a \$299 vector illustration program from Aldus, is the first computer graphics program to make this logic explicit by creating permanent links between objects. These links (which can be based on size, alignment, or numerical values) control the behavior and appearance of the elements in a drawing.



FLIPBOOK: Display images sequentially.

Concrete examples make this easier to understand. A technical drawing created with IntelliDraw can contain dimension lines that are dynamically

linked to the objects they measure. Resizing an object using a mouse automatically increases the value of the displayed label.

Likewise, you can build an underlying structure for flow diagrams and org charts by using alignment frames. These nonprinting frames automatically organize a collection of objects. Once again, the relationship between a frame and the objects it contains is always active. Even when you edit a drawing, IntelliDraw employs the rules you have established to realign and redistribute the objects in the frame.

AUTOMATIC SYMMETRY

To create and manage these logical links, IntelliDraw supplements standard drawing func-

• *Continues on page 40*

IN FIRST LOOKS

R:BASE 4.0	42
Video Blaster	42
ManagePro	44
Skylight	46
IBM 486 SLC2	46
Processor Upgrade	
FontMonger	48
Xante Accel-a-Writer	48
Pro AudioSpectrum 16	49
Networks! Connect	49
Pinnacle Micro PMO-650	50
HiJaak for Windows	50
Omega TAPE250	52
AtraDrive	52
DeltaGraph Professional	56
Stanford Graphics	56
NJoy	57

Quattro Pro

CONTINUED FROM PAGE 37

For example, to rearrange pages, all you need to do is drag their tabs with the mouse. To look at several pages side by side, you can simply open new windows on the common file and then apply the Tile command. To copy a block to a new page, just hit the page tab when prompted for the copy destination.

Segregation of distinct modeling areas is one of the chief benefits of a three-dimensional spreadsheet, and QPW serves that end nicely by allowing you to set grid-line display, protection settings, zero display, column-width defaults, and other attributes on a per-page basis.

Got sensitive data? Put it on its own page, deep within the notebook; then protect the page.

A handy Model Copy command greatly simplifies the modeling of alternative scenarios in QPW. Model Copy lets you replicate a two-dimensional range on a new page while updating absolute references so they reflect their new page locations.

For example, the formula `+$WorstCase:$A$1`, model-copied to the page named `BestCase`, becomes `+$BestCase:$A$1`. Instead of having to swap alternative values in and out of a single

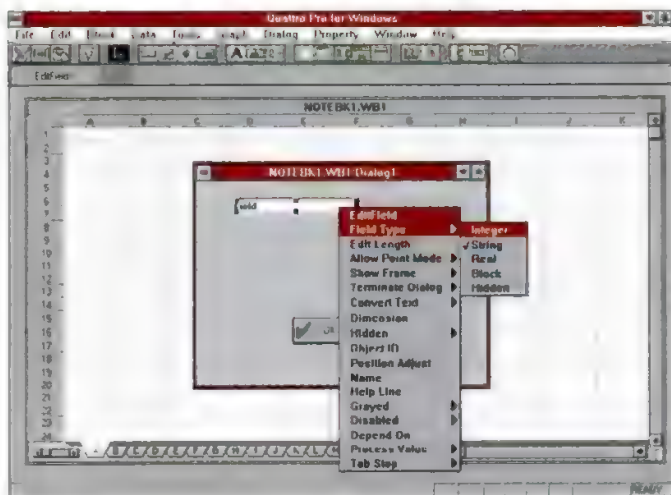
two-dimensional range, you can use Model Copy to create a set of identically structured pages, then tinker with the inputs on each page. It's less fancy than Excel's Scenario Manager but more usable, since Excel's add-in does not write its scenarios onto separately viewable and printable pages.

OBJECT ORIENTATION

Object orientation has been Borland's mantra for quite some time. In QPW, its most prominent manifestation is in its Menus-On-Demand. There are no formatting commands on QPW's menus. Instead, you right-click just about any component of your spreadsheet or of Borland's user interface, and the dialog box that appears lets you see and change attributes for the object that you clicked.

Right-click the application title bar, for example, and you can set global options such as the international date and time formats. Right-click the document title bar to apply recalc settings and other options that apply to a whole notebook. Right-click a page tab to modify a page's properties, or select a range and right-click to set formats for that range.

Whether this approach to setting attributes and options is really a benefit for spreadsheet users or merely a whizbang feature for ad copy isn't clear. On



CUSTOMIZE: *Creating a custom dialog box requires no procedural code. Palette tools provide dialog controls, and property lists control their appearance and behavior.*

■ How Quattro Pro for Windows Differs from Microsoft Excel

- **QPW is a three-dimensional program.** Worksheet files may contain up to 255 two-dimensional pages. Excel's workbook feature approximates three-dimensionality, but QPW's approach to multiple-page modeling is simpler.
- **All formatting in QPW is done by means of a property inspector.** You right-click on any worksheet, chart, or interface object to see and edit its properties. Right-clicking on an object in Excel brings up a shortcut menu of choices appropriate for that object.
- **Unlike Excel, QPW does drag-and-drop only on ranges,** not on individual cells. But QPW's SpeedFill can operate on discontinuous ranges, while Excel's Autofill cannot.
- **QPW provides more automatic formatting choices than Excel,** but Excel's feature is smart enough to recognize summary rows and columns and give them contrasting formats. (Most of QPW's canned formats put contrast in the bottom row and rightmost column, regardless of what those ranges contain.)
- **QPW can embed charts, macro buttons, and bitmaps** on worksheets, but its drawing tools cannot be applied directly to worksheet cells. Excel includes a true drawing layer, allows word-wrapped and rotated text labels, and includes a command for centering labels across multiple columns.
- **QPW charts live in their worksheet files;** Excel's may reside either in worksheets or in separate documents. Both programs

the worksheet, it seems neither here nor there. In QPW's charts, however, there are ambiguities and inconsistencies that make the property-inspection modus operandi a real pain, at least for the beginner. Is a secondary y-axis a property of the series assigned to it, or is it a property of the chart as a whole (in which case the series may be a property of the axis)? QPW declares the former. Is axis title text a property of the axis? You would think so, but here QPW (perhaps for compatibility with Quattro Pro for DOS) makes you use a Graph Titles command. Situations like these can make such menus confusing.

INTERFACE BUILDER

Where object orientation really shines in QPW is in the UI Builder, a slick set of tools for creating dialog boxes and icon palettes (which QPW calls

SpeedBars). When you invoke the UI Builder, QPW presents a default dialog box and a palette full of controls. To add a control to the dialog—an edit field, check box, radio button, spinner, command button, bitmap button, text label, group box, list box, combo box, pick list, file control, color picker, scroll bar, or time control—you simply hit the appropriate icon and drop it into the dialog box.

To assign attributes to the control, you right-click and choose from the property list that appears. Right-click an edit field, for example, and you can specify its data type and length, whether word wrap is available, whether point mode is available, and a host of other essential details. None of this requires a single line of code.

Linking UI objects to procedural code is similarly a matter of selecting property options.

First Looks

can display and print graphs either separately from or alongside worksheet data, but only Excel can save them separately. Charts in both spreadsheet programs can plot data derived from multiple worksheets, but Quattro Pro for Windows' three-dimensionality gives it the edge when it comes to plotting cross-sectional data.

- **QPW is shipped with Database Desktop**, a separate application that provides query-by-example connectivity with Paradox and dBASE files. Excel comes with Q+E, an Excel add-in that connects to dBASE, Oracle, Rdb, and SQL Server files. QPW's tool is easier to use; Excel's is essential if you need SQL connectivity.

- **QPW's macro language is an extension of Quattro Pro for DOS's** and presents a lower learning hurdle for users accustomed to writing macros in 1-2-3 or Quattro Pro. Excel's language, however, permits user-defined functions. Both programs can run most 1-2-3 2.x macros without a translation step.

- **QPW's UI Builder lets users create dialog boxes** without programming code. Excel's dialog editor is less versatile and much harder to use.

- **QPW is missing many sophisticated analytical and model-building features** available in Excel, including outlining, spell-checking, more powerful range-naming options, an easy-to-use crosstab report generator, a more complete set of statistical commands, and many advanced engineering, statistical, and financial functions.

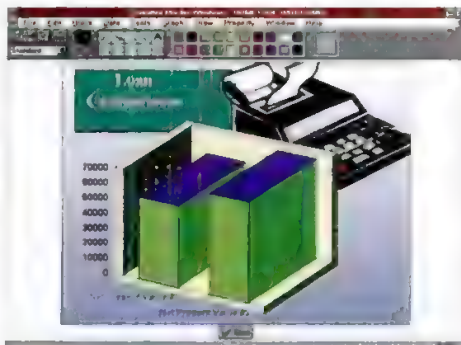
- **Excel supports OLE as both server and client, QPW as client only.—CS**

The linking paradigm is "ON event DO verb TO/FROM object," and the events, verbs, and objects (both direct and indirect) are all available from drop-down lists. Designing a custom interface, in short, has all the appeal and simplicity of creating forms in Visual Basic.

BACK TO BASICS

In terms of spreadsheet fundamentals, QPW is on a par with 1-2-3 for Windows but weaker than Excel and, in some respects, weaker than its own DOS counterpart. Because of its long development cycle, the product is closer to Version 3.0 of Quattro Pro for DOS than to Version 4.0. Notably absent are Quattro Pro 4.0's new analytic graphing features and auditor.

Named styles, user-definable display formats, and the nonlinear optimizer did make it into the new product, and QPW includes drag-and-drop cell manipulation, a tool for creating label and numeric series auto-



PRESENTATION: QPW's graphs can be beautified with gradient fills and bitmap images.

matically, a tool for blasting designer formats into selected ranges, and the inevitable sum button.

GORGEOUS GRAPHS

QPW's graphs are gorgeous and include rotatable 3-D types as well as options to adorn them with gradient fills and bitmapped images.

Its drawing tools are extensive, including lines, polylines, rectangles, ellipses, arrows, polygons, adjustable snap-to grids, and object alignment tools. To enforce a consistent look across a series of slides, you can save font, color, shading, and other formatting elements as named styles. As in Quattro Pro for DOS, a surprisingly extensive slide show utility is included, so you can use the program for rather sophisticated business presentations. Among its tools: a Graph Page in a QPW notebook, which stores individual graphs—or entire slide shows—as icons that you can easily keep track of; a light table screen for displaying and reorganizing slide thumbnails, and 24 transition special effects.

DATABASE CONNECTIONS

As might be expected from the vendor of Paradox and dBASE, Borland has made QPW as database friendly as possible.

The internal database functionality is standard spreadsheet fare, but for querying external dBASE and Paradox files, QPW comes with a separate Database Desktop application—a beautifully designed query-by-example tool based on the forthcoming Paradox for Windows. The Database Table Viewer lets you view and edit SQL, Paradox, and dBASE files, and you can read and write Paradox and all flavors of dBASE files directly. Remote database access is also part of the feature set.

Excel still has a long list of classy features unmatched by Quattro

FACT FILE

Quattro Pro for Windows, Version 1.0

Borland International,
1800 Green Hills Rd., P.O.
Box 660001, Scotts Valley, CA
95067; 800-331-0877,
408-438-8400.

List Price: \$495

Requires: 2MB RAM (3MB recommended), 10MB hard disk space, Windows 3.0 or later

In Short: A strong first entry into the Windows spreadsheet market, QPW features a three-dimensional worksheet structure. The program's analytic features fall short of Excel's, but its notebook metaphor makes multipage worksheets more functional than ever before

© 1992 ON-READER SERVICE CARD

Pro for Windows, including a crosstab report generator, outlining, spell-checking, more powerful range-naming options, array formulas, diagnostic error messages, a more complete set of statistical commands, and many advanced engineering, statistical, and financial functions. Excel also includes crosstab and charting Wizards, special step-by-step helpers that guide you through the steps when you don't know quite what you're doing. First implemented in Microsoft's low-end Publisher package, Wizards is a clever idea that shows Microsoft's serious commitment to usability and gives Borland something to shoot for.

Nevertheless, despite all the great features that have made Excel an Editors' Choice winner several times over the years, Quattro Pro for Windows is shaping up to look like a strong competitor. The challenge from Borland is very much real, and this is only Version 1.0. □



From September 21-25, you can go online to discuss Quattro Pro for Windows with PC Magazine Contributing Editor Craig Stinson and Borland QPW Product Manager Song Huang. Type GO ZNT:EXEC at any CompuServe prompt.

IntelliDraw

CONTINUED FROM PAGE 37

tions with unique tools and commands. The program has the rectangle, oval, freehand, and line tools that you find in all vector drawing programs, but it also contains functions such as dimension lines, connector lines, and Symmetricon and Connectigon tools.

Objects created with these tools always exhibit a particular behavior. For example, connector lines are quasimechanical couplers that link two or more objects. So when you rearrange elements on the page, the connector lines are automatically redrawn to maintain the link. And as their names imply, the Symmetricon and Connectigon tools create perfectly symmetrical objects and permanently connected polygons, respectively.

When you draw or edit a Symmetricon, you work with only one facet of the shape—the program automatically creates the other mirrored sides for you. And when you modify a Connectigon, the adjoining polygons are automatically reshaped to maintain contact.

SMART PICTURES

These intelligent objects are just the beginning of the smart pictures you can create with IntelliDraw. The program supplements standard organizational devices such as grouping, layering, and multiple pages with innovative Action buttons that control the relationship between two or more objects. Action buttons force objects to have the same height and/or width, to exhibit the same angle of rotation, or to maintain a position relative to one another. When you edit one part of your drawing, these logical links kick in and automatically modify the associated objects.

Unlike Aldus Freehand, Aldus's flagship drawing package, IntelliDraw does not offer a named styles palette. However, the program's structure makes it easy to execute global changes.

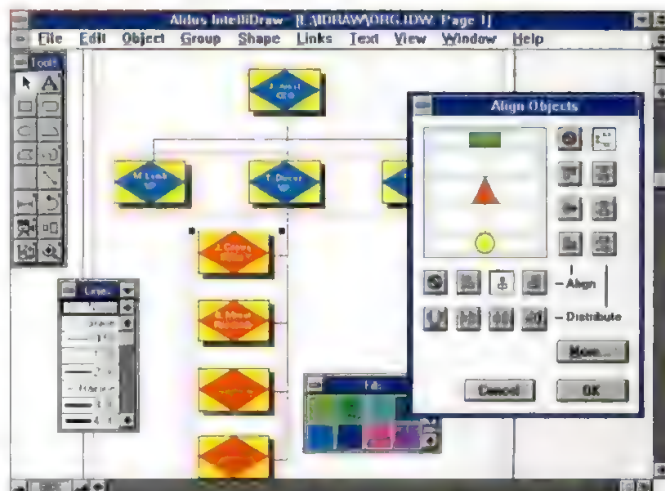
For example, all of the fill and line styles stored in floating palettes are mapped. When you edit the palettes, all of the objects that use that attribute are redrawn to reflect the change you've made.

EASY TO USE, SOMETIMES

One little word of warning: IntelliDraw's unique approach to vector illustration alternates between elegantly easy-to-use tools and difficult-to-master functions. For example, one of IntelliDraw's strengths is its ability to create modest animated effects. The most direct method is a single command that groups objects together as a flipbook. Flipbooks are nothing more than a series of overlapping images that display sequentially.

Compare this to IntelliDraw's Animation tool, a macro recorder that stores and then plays back move, rotation, and resizing instructions. To complete an animation, you must use two different dialog boxes and create individual links for each property, such as width versus height changes.

This same inconsistency applies to the program's drawing tools. For example, business users who are stumped by the curve and node editing func-



ORG CHARTS: *IntelliDraw creates permanent links between objects based on size, alignment, or numerical values.*

tions of standard drawing programs will love IntelliDraw's editing tools. Instead of clipping and joining lines to open or close a shape, you simply overlap two or more objects and then add or subtract them. However, reshaping curves—an essential feature in a vector drawing program—leaves a lot to be desired. IntelliDraw can create both spline and Bezier curves, but after you draw them they're nearly impossible to distinguish from one another.

Business users looking for an all-in-one drawing solution will discover that IntelliDraw lacks a few key features. For example, the program has a screen-show command, but without a runtime playback module it's difficult to distribute your presentations.

There are no automated typographic effects, such as text alignment along a curve, although the program does ship with Adobe Type Manager and supports TrueType. And while you can link noncontiguous text blocks, a lack of user-defined kerning, hyphenation controls, and tracking settings limit the program's usefulness for DTP projects.

In addition, the relatively strong import filters are offset by only .EPS and .WMF file export options. You can bring in .BMP, CGM, .PCX, TIFF, .WMF, and .XLS files, but text

import is limited to ASCII, and imported .EPS files are not editable within the program. In fairness to IntelliDraw, you can circumvent these limitations by using the program's OLE functions.

GRAPHIC POWER AT A PRICE

We found performance to be a major issue during testing. In addition to all of the usual display overhead (figuring out how to clip a gradient fill, for example), IntelliDraw must also resolve the links and behavior of each object each time it draws the screen. Although you can improve performance by changing the number of undo levels and the status of screen buffers, IntelliDraw requires serious resources to get up to speed—like a 486 processor and a substantial amount of virtual memory in the form of a permanent Windows swap file.

Despite IntelliDraw's low price, it's not a program for casual users or beginning illustrators. In fact, using links indiscriminately can create serious conflicts within a drawing. Nevertheless, IntelliDraw offers exceptional value and extraordinary functions for users who need a parametric drawing program. If you're willing to explore IntelliDraw's powerful linking functions, you'll be rewarded with a drawing that is truly dynamic. □

FACT FILE

**Aldus IntelliDraw,
Version 1.0**

*Aldus Corp. Consumer
Division, 9770 Carroll Center
Rd., Suite J, San Diego, CA
92126; 206-628-2320.*

List Price: \$299

Requires: 4MB RAM, 3.5MB hard disk space, Windows 3.0 or later, Adobe Type Manager 2.0

In Short: The \$299 price tag belies the sophistication—and complexity—of this vector illustration package. An IntelliDraw picture can include parameters (such as numerical data, sizing instructions, and alignment relationships) that control the behavior and appearance of objects dynamically.

426 ON READER SERVICE CARD



THIS IS THE INNOVATION
THAT SET THE STANDARD
THAT'S PART OF THE HERITAGE
THAT CREATED THE NEW COMPANY
THAT'S MAKING ITS MARK
BY HELPING YOU
MAKE YOURS.



A brand new company with 50 years of experience. A two-billion-dollar company with all the spirit of a start-up. This is Lexmark International.

Created in 1991 from a division of IBM, Lexmark inherited a half-century of product leadership and innovation. Today, we're an independent, worldwide company, restructured to respond more quickly to customer needs. Implementing new development processes to bring products to market faster. And dedicating ourselves to one idea: everything we make, from award-winning IBM LaserPrinters and typewriters to IBM office-equipment

supplies and keyboards, will excel at letting you make your mark on the world.

To learn more about Lexmark, call us at 1 800 358-5835, ext. 222.

CIRCLE 081 ON READER SERVICE CARD

LEXMARK™

Make Your Mark

Databases

R:BASE 4.0: The First 32-bit Database for DOS

BY JOE SALEMI

A leaner, more robust Microrim has bounced back from hard times and leapfrogged over its competition with the release of the \$795 R:BASE 4.0, the first 32-bit DOS-based database.

R:BASE 4.0 uses a DOS extender to access protected-mode 32-bit memory on 386- and 486-based systems that have a minimum of 2.5MB extended memory available. It works fine in a DOS session under OS/2.2.0 and on most Windows 3.x systems, but Microrim is trying to fix problems it has identified when running R:BASE 4.0 in a DOS session under Windows 3.1 on 386-based systems without a math coprocessor.

The move to 32-bit technol-

ogy brings significant performance improvements over Version 3.1c. In informal testing, Version 4.0 performed at least 50 percent faster than the previous version for most operations.

The increase is due to a number of factors. By loading all the program code into extended memory, it no longer has to read program code from disk overlays, and it leaves most of the lower 640K available for your database applications. To further increase the amount of data stored in memory and reduce disk access delays, you can adjust the size of R:BASE's internal buffers.

R:BASE's use of 32-bit

memory has increased the maximum size of databases far beyond that of any other PC-based database today; 400 fields, 16,000 tables per database, and unlimited database size.

R:BASE has always been a strong platform for application development. It uses SQL as a native language, and its Applica-



REFERENTIAL INTEGRITY: R:BASE 4.0 prevents users from deleting dependent data.

tion Express ranks among the best application generators. Enhanced capabilities include a built-in interactive source code

debugger with trace, watch point, and break point capabilities. It implements a limited form of referential integrity through a "Restrict Deletion" rule, which prevents users from deleting a row of data when it's dependent on data in another table. R:BASE is the first PC-based database outside of the SQL database servers to do this.

For the performance gains of 32-bit technology, current R:BASE users will definitely want to upgrade, and new database users will want to give it a serious look.

• **List Price:** R:BASE, Version 4.0, \$795; 5-user Network Pack \$995; upgrade, \$149. Requires: 386-based PC or better, 4MB RAM, 8MB hard disk space, DOS 3.1 or later.

Microrim Inc., 15395 S.E. 30th Pl., Bellevue, WA 98007; 206-649-9500; fax, 206-746-9438.

Circle 427 on reader service card

Multimedia

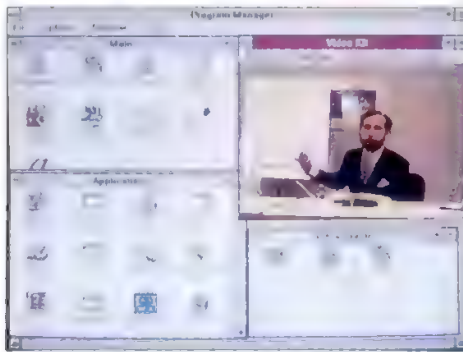
Video Blaster Makes Video in A Window Affordable

BY ROBERT KENDALL

Among the many parts that make up that nebulous whole called multimedia, full-motion video is the flashiest as well as the most expensive. Creative Labs, the company best known for its Sound Blaster sound cards, is helping to make it more affordable with its \$495 Video Blaster, now the least expensive full-featured option for displaying NTSC video in a window on any VGA monitor.

The Video Blaster occupies a full-length slot beside your VGA card, connecting to the VGA card's feature connector via a ribbon cable. You can attach up to three different VCRs or laserdisk players to the board's three

composite video connectors and switch among them via software. Unlike more expensive products on the market, the Video Blaster doesn't support



MOTION PICTURE: The Video Blaster displays NTSC video in a fully resizable window.

higher-quality S-video input.

The board has a mixer and stereo audio input and output jacks, so you can control the volume of sound from your video

device and mix it with inputs from other sources, such as a CD-ROM drive. It has no treble, bass, or balance control.

The Video Blaster's video image allows only 2.1 million colors, rather than the full gamut of 16.7 million colors supported by many competitive products. The image quality is very good, though close inspection reveals a few flaws, such as distortion around the borders of moving images.

Creative Labs provides rudimentary DOS controller software as well as more sophisticated Windows utilities that let you scale the video window to any size.

To capture individual frames of video, you can freeze the video image and save it as a .BMP, .GIF, .PCX, TIFF, .TGA, or IBM MMotion file in color depths ranging from 8 to 32 bits. There's a Windows Media Control Interface driver, which means any Windows multime-

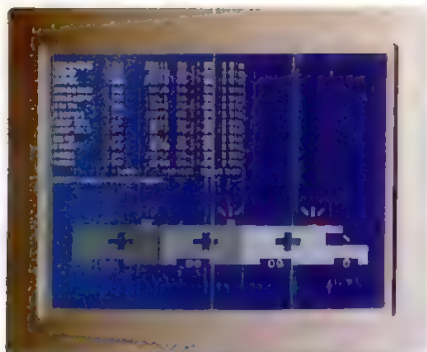
dia package that can send MCI commands can control the Video Blaster.

If you want to get started working with multimedia right away, the board comes bundled with Mathematica's Tempura Show and Creative Labs' MMPlay—simple DOS multimedia presentation programs that combine graphics, animation, music, and motion video.

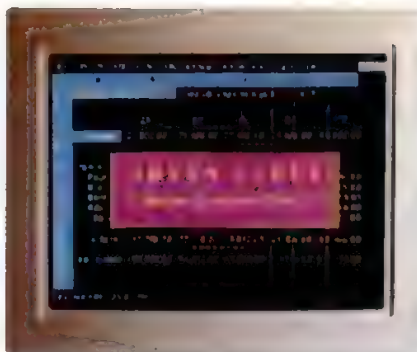
The Video Blaster's video image may not be flawless, but it's certainly good enough for most purposes. The board matches most higher-priced products in image manipulation features, and its MCI driver makes it an excellent choice for multimedia authoring.

• **List Price:** Video Blaster, \$495. Requires: 2MB RAM, full-length 16-bit slot, VGA adapter with feature connector, DOS 3.0 or later, Windows 3.0 or later (for Windows software). Creative Labs Inc., 1901 McCarthy Blvd., Milpitas, CA 95035; 800-998-5227, 408-428-6600; fax, 408-428-6611.

Circle 428 on reader service card



Ambulance Car Virus. Ambulance randomly moves across bottom of display.



Friday 13th Virus. Alias "Black Friday." Erases programs when you try to run them.



Disk Killer Virus. Alias "Ogre." Causes unexpected formatting of your hard disk.



Stoned Virus. Alias "Hawaii." Data loss caused by damage to directory and FAT.



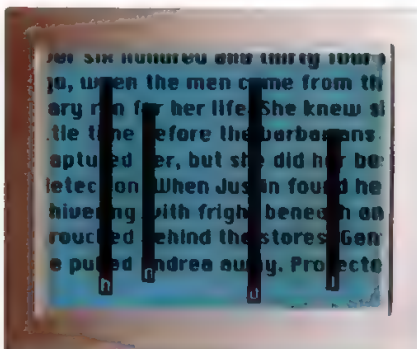
Datacrime Virus. Adds garbage to files and reformats disk.



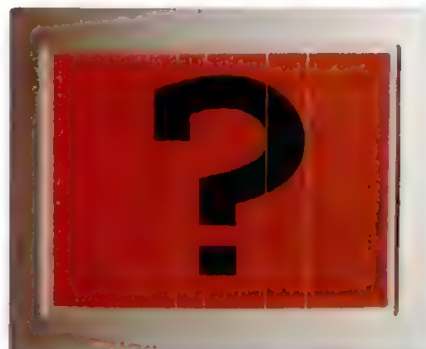
AirCop Virus. Alias "Red State." Attacks boot sector on non-write-protected diskettes.



Ping Pong Virus. Alias "Bouncing Ball." Wipes characters off the screen.



Falling Letters Virus. Characters fall to the bottom of the monitor. Creative, but a real nuisance.



With over 50 new viruses each month, who knows what's next.

You Could Get By Without An Anti-Virus Program. Then Again, So Could These.

These days, with networks, modems, laptops, and more and more people sharing files, it's only a matter of time before a virus attacks your data.

To make sure you get them before they get you, you need Central Point Anti-Virus.™ The only anti-virus program with File Immunization that protects your files so they can never be infected again. Central Point Anti-Virus detects over 1200 viruses and destroys twice as many viruses as other programs. It'll even protect you from unknown viruses by searching for suspicious behavior.

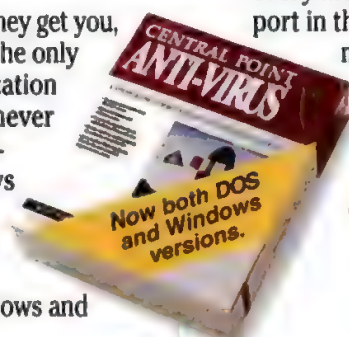
Central Point Anti-Virus offers both Windows and

DOS versions, and it works great across your Novell network.

And since there are about 50 new viruses popping up every month, we give you the most comprehensive support in the business. Including a free update, quarterly mailings, a 24-hour hotline with FaxBack, and BBS and Compu-Serve support forums.

If you want the most complete virus protection, there are really only two things you can do. Call 1-800-445-4038 for more information. Or unplug your computer.

Central Point Software INC
Making Computing Safer, Simpler, Faster.



Management

New ManagePro for Windows Tracks Your Team's Goals

BY HENRY FERSKO-WEISS

Combine 20 percent project management software with 20 percent personal information manager, toss in a set of structured tools for managing people and setting goals, and you've got ManagePro for Windows, a \$395 "goal and people manager" from Avantos Performance Systems.

Unlike anything that we have seen before, ManagePro implements a structured approach to managerial project planning, employee goal setting, and progress tracking. The program also helps you keep up with providing regular feedback to everyone on your staff. It's designed for the kind of goal planning that precedes the development of specific projects that you might track with a project management program. And it works.

GOAL PLANNER

ManagePro's initial screen lets you choose between the program's two main feature sets: goal planning and people management. While the program seems to have a split focus, its two sets of tools are highly integrated. You're likely to have windows open from both sides of the program, so it's less important which fork in the managerial process you take first.

On the goals side, you can access three principle views: Goal Planner, Timeline View, and Goal Status Board. The Goal Planner presents a spreadsheet-like table in which you enter a goal, the names of the people responsible for it, and their status. The outline format makes it easy to promote and demote goals in the hierarchy and to open and close levels. You can also link child goals to

more than one parent goal if you wish.

You can add or change the columns in the Goal Planner by clicking on a wrench icon at the top of the window. To the side of the spreadsheet are several view buttons that jump to a progress screen, a details screen, or a notes screen. All the main view windows have both action buttons and view buttons. The large view buttons have pictures and labels so you never have to guess what they do.

In the Goal Timeline view you see the outline of goals, along with a bar chart showing each goal's duration, its start date, and its due date. You can interactively manipulate the bars to change the dates or duration as necessary. The Goal Status Board displays the outline of your goals as a network diagram. The color of a goal box indicates its current status: Green means everything is okay, yellow means one subgoal is behind, and red means at least

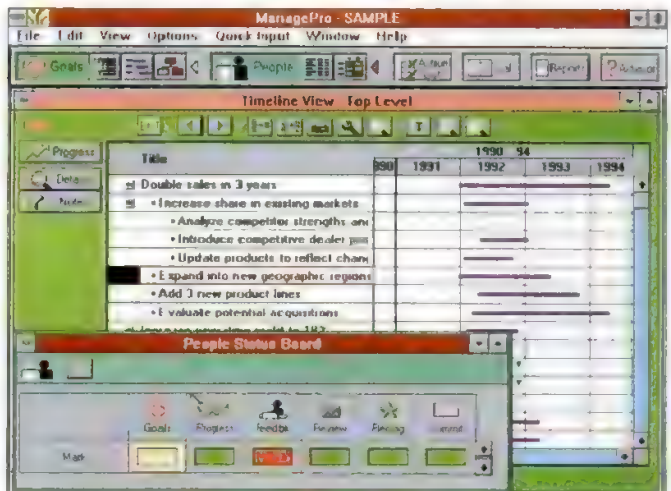
one subgoal is critical.

These two charts are similar to the Gantt and PERT charts found in typical project management programs, but they don't show work dependencies or a critical path.

let you add development plans for improving an employee's skills, jot down commitments you make to support them, and view their calendars.

When you enter feedback on people, a context-sensitive Advisor invoked by a button on the main icon bar gives you advice on management techniques. The tips can help you improve your own skills in setting goals, giving performance reviews, or helping someone with time management.

The People Status Board is



GOAL TENDER: ManagePro reminds you to give staff feedback.

PEOPLE MANAGEMENT

ManagePro also encourages the development of management skills that good managers have but tend to forget in the crunch to get work done. The program's two main people-management views are the People Planner and the People Status Board.

The People Planner is where you enter the core information on the people you work with. Like the Goal Planner, it looks like a spreadsheet. In the Who column, you list individuals and teams; in the Reminders column, you indicate whether you want the program to prompt you to periodically review a person's progress or to give them feedback. A group of view buttons to the side of the spreadsheet lets you open other windows to review an individual's goals, progress, and feedback comments. Other view buttons

an at-a-glance view of how each person is handling goals and of how you're doing in communicating feedback to each employee via reviews, recognition, and commitments. The status of each activity is represented by a colored box. It's hard to ignore a red box showing that someone hasn't had feedback for at least three months.

Other buttons access an action list (current goal status), a global calendar, and reports. The program comes with over 30 predefined reports. You can also choose among four user models that enable you to adapt the program to your management style and let you focus only on goal planning or on people management.

If you have at least four people reporting to you, ManagePro is an excellent tool for helping you become a better manager. □

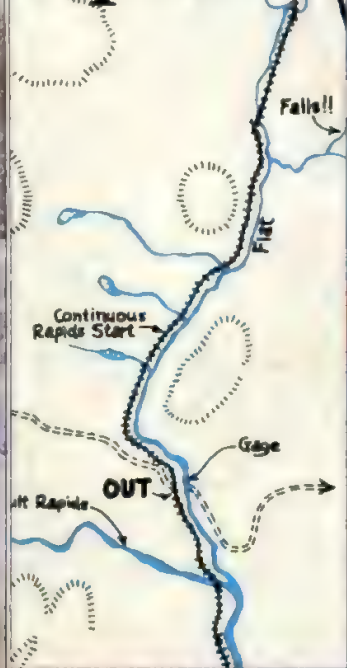
FACT FILE

ManagePro for Windows, Version 1.0
 Avantos Performance Systems Inc., 5900 Hollis St., Suite C, Emeryville, CA 94608; 800-282-6867, 510-654-4688; fax, 510-654-1276.

List Price: \$395, network access modules, \$99 per station
Requires: 2MB RAM, Windows 3.0 or later
In Short: ManagePro for Windows helps plan your goals and manage your staff. Through tables and graphs, you can maintain detailed information on goals and progress, as well as the progress of employees in meeting performance goals you've set for them

ON READER SERVICE CARD

Project plan.



Project in progress.

That's why you need Primavera.

Planning a project is one thing.

Controlling a project is a million things all at once. And for navigating all the twists and turns that your project might take, no software offers more than Primavera Project Planner®.

Survive the hazards the map never shows.

Throughout your project, and especially when the unexpected pops up, Primavera provides superior status reports to keep you on top of the situation.

Standard and custom reports help you plan, organize, control and negotiate: *How is our productivity? What have we accomplished? What work remains? Have we got the right people in the right assignments?*

More important, Primavera helps you communicate effectively so the team can solve project problems as they arise.

"What-if" capabilities let you evaluate alternatives, develop workarounds, help you reassign resources or budgets to get back on course. Superb project graphics pinpoint problems and illustrate

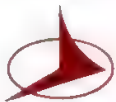
solutions—and let you communicate clearly with everyone connected to the job.

Software to keep your crew in sync, even in the roughest waters.

Primavera is fully multiuser. All members of your team can work on any parts of the same project—or group of projects—simultaneously. It's one more reason why Primavera Project Planner is the software of choice for thousands of projects around the world.

The video is FREE. And so is the call.

Contact Primavera at 1-800-423-0245 for more information and a free video presentation about Primavera Project Planner. Do it today—for better project control tomorrow.



PRIMAVERA

*How the world says
project management*

Two Bala Plaza • Bala Cynwyd, PA 19004
(215) 667-8600 • FAX: (215) 667-7894

CIRCLE 148 ON READER SERVICE CARD

Windows Utilities

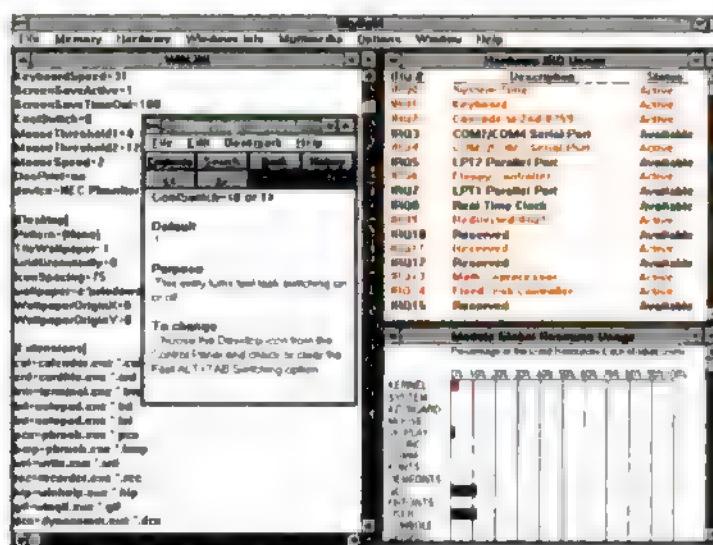
Skylight Reports and Changes Every Windows Configuration Imaginable

BY NEIL J. RUBENKING

Are you drowning in a sea of Windows configuration details? Skylight (\$99.95), from RenaSonce Group, brings Windows under control. Its smart editor eases the task of setting up the WIN.INI and SYSTEM.INI files by providing context-sensitive help for hundreds of standard entries. And when the phone support technician asks whether your display device requires banding support or which IRQ lines are in use, Skylight's report windows will give you the answer.

Skylight is a reporting tool that tells you precisely what's inside your system. Skylight's smart editor is keyed to four files: WIN.INI, SYSTEM.INI,

AUTOEXEC.BAT, and CONFIG.SYS. To get help on any line in one of these files, you click on it with the right mouse button or press Shift-F1. The resulting help screen spells out the purpose of the line in question, sometimes including a list of possible values. For entries in the two .INI files, Skylight also specifies the best way to change the line, because some lines shouldn't be edited directly. Unfortunately, the smart editor doesn't include a search feature, and the Search button in the help system is disabled. Even so, it's vastly easier to use Skylight than it is to look up the .INI file entries in the Windows manual or



TELL ME MORE: Skylight displays several system reports on the screen simultaneously.

Windows Resource Toolkit.

Skylight produces over two dozen reports on system hardware and software, many of which are simply collections of data supplied by Windows. But Skylight gathers all the reports

in a single utility, and displays information on memory usage, multimedia capabilities, and IRQ (Interrupt Request) lines.

Skylight displays your memory and system resources graphically and in text form. If

your system is running out of free system resources, a graph will help identify resource hogs.

The smart editor alone is worth Skylight's price; WIN.INI and SYSTEM.INI are too complex for most users to edit without help. All but the memory and resource reports will probably be ignored until trouble strikes. But when it does, Skylight's reports can help pin down the source.

•List Price: Skylight, Version 2.0, \$99.95. Requires: Windows 3.0 or later. RenaSonce Group Inc., 5173 Waring Rd., #115, San Diego, CA 92120; 619-287-3348; fax, 619-287-3554.

Circle 432 on reader service card

PC Preview

IBM's PS/2 Upgrade Chip

BY BRUCE BROWN

IBM has a processor upgrade kit ready to roll out this fall that will significantly speed up older machines. The PS/2 486SLC2 Processor Upgrade (\$935) is an easy retrofit for PS/2 Model 56 and 57 SXs and SLCs.

It may seem expensive, but the 486SLC2 kit boosts performance dramatically. The 3.3-volt 20-MHz 486SLC2 has a four-way associative 16K cache, a clock-doubler for 40-MHz internal performance, a burst mode data bus, and the 386SLC's application-oriented design optimization. The 486SLC2 does not have an internal math coprocessor, but the upgrade kit daughterboard has a coprocessor socket.

The 486SLC2's 16-bit data path may raise the eyebrows of those who think Cyrix's 486SLC is misnamed because it, too, lacks the 486's 32-bit data path.

However, the kit is manufactured by IBM under agreement with Intel, and since it runs the 486 instruction set, both agree it's a 486.

The 486SLC2 turned in impressive performances on PC Labs' Benchmark tests. Compared to IBM 386SLC systems,

processor scores are almost twice as fast, and memory scores are 56 percent better. Compared to 25-MHz 386SL systems, the 486SLC2 is twice as fast on processor tests and memory tests.

IBM recommends dealer installation, but you can easily plug the daughterboard into the math coprocessor socket.

If you need a math coprocessor, you should buy a true

486DX or DX-2 system, but if you're a current PS/2 Model 56 or 57 SX or SLC owner, the 486SLC2 upgrade is the easiest way to boost performance.

•List Price: IBM 486SLC2 Processor Upgrade, \$935; upgrade for purchasers of PS/2 56 and 57 SLC systems by October 1, 1992, \$259; IBM Corp., Old Orchard Rd., Armonk, NY 10504; 800-772-2227; fax, 800-426-4329.

Circle 429 on reader service card

Benchmark Tests: IBM 486SLC2 Processor Upgrade

We tested IBM's 20-MHz 486SLC2 chip installed as an upgrade to a PS/2 Model 56 SX. The chip's four-way associative 16K cache and speed-doubling technology for 40-MHz internal performance helped it achieve impressive processor and memory scores.

We used PC Magazine Labs' Hardware Performance Tests, Release 6.0, to measure the PC's processor, memory, disk, and video subsystem performance. The Graphics Winmark is the geometric mean of 12 Windows-based graphics tests from WINBENCH 2.5, weighted to reflect how frequently various functions are used.

Higher scores represent better performance.	Processor (operations per second)	Memory (kilobytes per second)	Disk (kilobytes per second)	Video (thousands of operations per second)	Graphics Winmark (megapixels per second)
33-MHz 486DX average	351	5,330	121	1,980	N/A
IBM 20-MHz 486SLC2 Processor Upgrade	302	5,436	77	3,765	3.59
25-MHz 486SX average	265	4,647	91	2,165	2.42
25-MHz 386SL average	127	2,722	86	1,443	1.22

N/A—Not applicable: PC Magazine Labs has not yet run the test on enough machines of this type to compute a meaningful average score.

2+3=1

PC COMPUTING

- 1 MS-DOS 5.0
- 2 QEMM 386
- 3 STACKER
- 4 AFTERDARK

UTILITIES RANKING

THE #2 AND #3 UTILITIES AT THE #1 PRICE

\$89



\$65



LIMITED OFFER

BUY BOTH \$139

FIRST 1000 ONLY

Monday thru Friday 6AM to 5PM PST

1-800-274-6611

CIRCLE 097 ON READER SERVICE CARD

FREE GROUND SHIPPING

20969 Ventura Blvd. Woodland Hills CA 91364 818-710-9174



Plain Wrap Prices,
Black Tie Service.

FAX your order 24-hours

1-818-884-5310

SAME DAY SHIPPING

Price subject to change without notice.

■ Fonts

Ares FontMonger Converts, Customizes, and Edits All Your Windows Fonts

BY EDWARD MENDELSON

Ares Software's \$149.95 FontMonger is the first utility of the TrueType era that lets you convert your fonts from one format to another, move characters and symbols between fonts, and even edit the shapes of the characters.

As a font converter, FontMonger provides far better output than Atech Software's AllType, and as a font editor, it's far more flexible and powerful than Zsoft's Publisher's Type Foundry. If you want to modify scalable fonts, this Windows-based program is the only practical way to do the job on the PC.

FontMonger imports scalable typefaces in formats used by TrueType, PostScript Type 1, Intellifont, CorelDRAW, and LaserMaster, plus the Nimbus Q format used by GeoWorks Ensemble, Zsoft's Soft Type, and the PostScript Type 3 formats used by major vendors. It also imports all standard Macintosh and NeXT fonts.

FontMonger exports to all these formats except Intellifont, CorelDRAW, and LaserMaster. When you import a font, FontMonger converts it to its own format, so even if you export a font in the same format you import it, some details of the design will change. It's mathematically impossible to convert hinted font formats without distortion, and generally impossible even with unhinted formats such as Type 3.

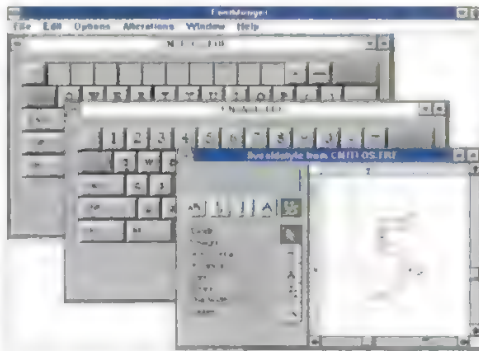
If you use the FontMonger program to convert professional-quality fonts from Intellifont or Type 1 to TrueType, you may gain in convenience but you will lose the subtleties of the original design and the customized hinting that the original

vendor may have applied to individual characters. If you convert shareware or unhinted fonts, you may even get superior output quality because Font-

Monger automatically adds hints to the font.

If you want to modify a font, FontMonger displays a keyboard with the characters displayed on the keycaps and lets you select them for moving or editing. You can also display a numbered chart of all characters in the font. You can display multiple keyboards or charts and easily transfer characters or groups of characters among them.

Typographically expert users will jump at the chance to move characters from specialized



TYPE SPECIALIST: FontMonger lets you move characters from one typeface to another.

■ Printer Enhancements

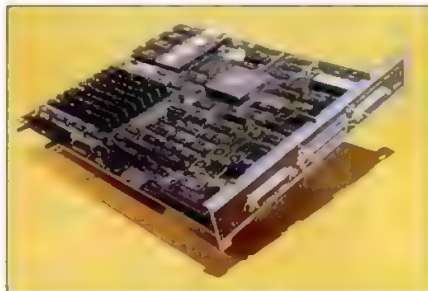
Xante Accel-a-Writer: A PostScript Transplant for Your LaserJet

BY EDWARD MENDELSON

Xante's \$1,695 Accel-a-Writer replacement controller board transforms any 300-dot-per-inch HP LaserJet into a fast 600-dpi PostScript printer. Unlike other PostScript upgrades, it makes the printer fully network-compatible while increasing both speed and resolution, and it's the one PostScript upgrade that works with all LaserJet models, even the original.

Xante offers 600-dpi text and line art, plus gray-scale graphics at 850 dpi with up to 65 gray-scale levels. You lose the LaserJet's built-in functions, but you get LaserJet II emulation that you can select from the front panel in place of PostScript.

Installation is not for the squeamish. With the help of a supplied videotape or the less detailed advice in the manual, you remove the inner and outer



SPEEDSTER: The Xante Accel-a-Writer.

case of your LaserJet, detach the original HP motherboard, and screw on the Xante board. You'll have to toss out your font cartridges and RAM boards.

You can upgrade the 6MB RAM on the basic model to 8MB, 12MB, or 16MB, or start with a 12MB board for \$2,495. The 12MB model tested by PC Magazine Labs printed a 16-page text file in 2 minutes 17 seconds at 300 dpi, and in 3 minutes at 600 dpi; a LaserJet III with

fonts with true small-capitals and "lowercase" numerals into standard fonts. And for the first time, with Type 1 fonts you can gain access to characters normally inaccessible in Windows.

Without kerning controls and customized hinting, FontMonger isn't a professional-level font editor. For that, you'll have to wait for Altsys's \$495 Fontographer for Windows, due later this year. But for anyone who doesn't need high-level design tools and wants to customize or convert fonts, FontMonger is the only program that does the job both easily and effectively.

• List price: \$149.95. FontMonger, Version 1.0. Requires: 2MB RAM, Windows 3.0 or later. Ares Software, P.O. Box 4667, Foster City, CA 94404; 800-783-2737, 415-578-9090; fax, 415-378-8999.

Circle 419 on reader service card

HP's 300-dpi Adobe PostScript Cartridge Plus needed 3 minutes 30 seconds. A complex graphics image took the Xante board 35 seconds at 300 dpi and 70 seconds at 600 dpi. The cartridge needed 110 seconds.

Adobe PostScript 600-dpi

printers are now easy to find, but the Xante board is one of the few PC-compatible models that lets you attach a SCSI hard disk to the printer for font storage. Or you can install flash memory directly on the board that acts like a fast hard disk. 512K of flash memory costs \$100.

If you want a transparently network-compatible 600-dpi upgrade to a LaserJet, Xante is your only choice.

• List Price: Xante Accel-a-Writer controller, with 6MB RAM, \$1,695; with 12MB RAM, \$2,495. Requires: LaserJet or Apple LaserWriter. Xante Corp., 2559 Emogene St., Mobile, AL 36606; 800-926-8839, 205-476-8189; fax, 205-476-9421.

Circle 430 on reader service card

Can You Spot The Winner?



Gateway 2000 The Winners Circle



Gateway 2000 employees were photographed for the summer fun ad at Atokad Park in South Sioux City, Nebraska.

1. Follow instructions on the other side

Back

Gbs5llpBack-001B



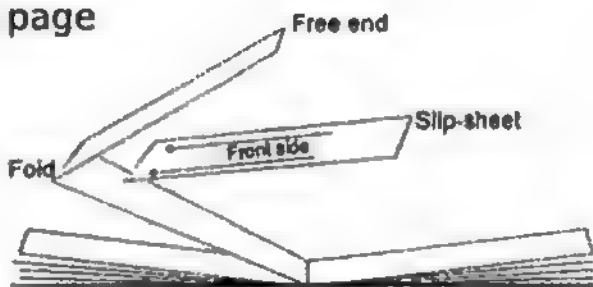
Inverted Back

1. Follow instructions on the other side

Folded edge of the page

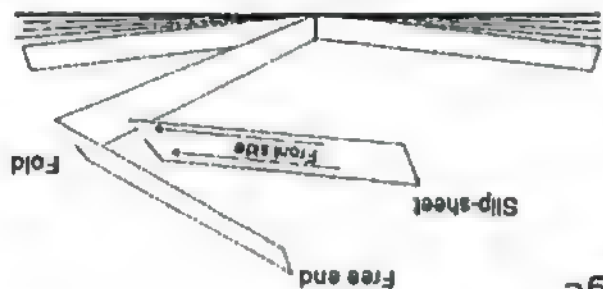
Inverted Foldout slip-sheet

1. Open the foldout page
2. Insert this sheet with
 1. Front side touching the free page
 2. Arrow pointing to the fold
3. Slice the folded edge
4. Close the page and slip-sheet

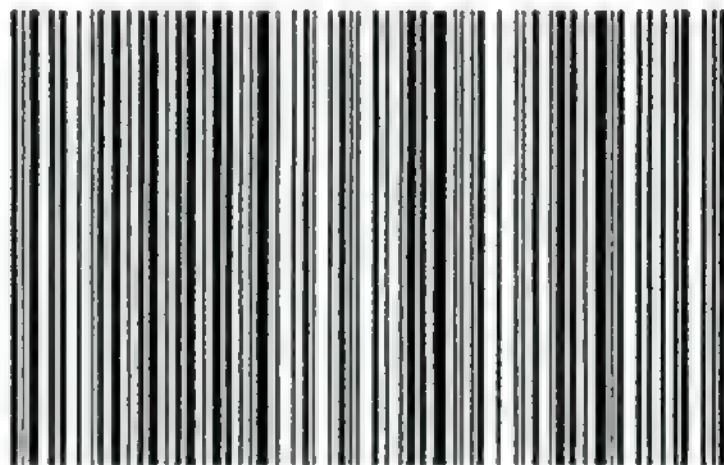


Foldout slip-sheet

1. Open the foldout page
2. Insert this sheet with
 1. Front side touching the free page
 2. Arrow pointing to the fold
3. Slice the folded edge
4. Close the page and slip-sheet



GbsSlipSheet-001



It's Gate That Puts You In T



The Choice Is Black & White!



The results are final — all those thoroughbred "favorites" outdistanced by a simple, determined, black-and-white cow! And once again, Gateway 2000 leads the pack to bring you new technology at down-on-the-farm prices.

We've incorporated Intel's new 66MHz DX2 clock-doubler chip, the fastest processor available today, in a reliable ISA machine with racing video and disk performance!



It's just one more big winner in our lineup of value-packed, high-performance systems. So give us a call and get in the Gateway 2000 Winner's Circle!



"You've got a friend in the business."

CASHIER



VALUE

HERE'S A HOT TIP: GATEWAY 2000 IS A SURE THING!

Before you put your money down, study the statistics on the contenders. The current trend in the PC industry is to cut prices by stripping down systems and replacing quality components with inferior parts. Even companies with long-standing traditions of quality are doing it. At Gateway, we've never lowered our prices in response to market pressures. We've never needed to. And we'll never sacrifice features or quality to make prices look better. Our race strategy has always been to offer the best price, quality and service in the market.

Price

Gateway's price advantage is simple business economics. We have huge volume buying power. The little guys don't. We have low overhead. You don't pay for glass palaces with us. And we operate on conservative margins. While we've grown big and strong on these rations, our margins are a starvation diet for some of our competitors. We lower prices whenever we can. And we've been quietly doing this since day one.

Quality

When surveyed recently by *PC Magazine*, Gateway customers gave their systems the **highest reliability rating** among 35 of the nation's top PC manufacturers. That's certainly an indication that our great prices aren't a trade-off for quality or performance. Gateway systems are loaded with top-of-the-line components and performance features. We know you don't want a cheap computer. You want a great computer at a great price. You want a Gateway!

Service

We know how important service is to you. That's why we're constantly working to provide the best in the business. Service is one of the reasons we received the **highest customer satisfaction rating** in *PC Magazine's* service survey. Gateway scored "significantly better than any other manufacturer" when PC users were asked, "Would you buy again from the same manufacturer?"

Price. Quality. Service. This simple formula still equals the best value in the industry. Add Gateway's ability to bring you the latest technology at the best prices, and you have a triple-crown winner. So put your money on a sure thing. With Gateway 2000, you're guaranteed to come out a winner!





GAIN THE WINNING EDGE WITH 486 PERFORMANCE

Gateway's powerful 486 models give you the winning margin! And when you recap our new price reductions and compare us feature-for-feature against other runners, you'll find you won't even have to play your hunches — Gateway 2000 is the odds-on favorite.

25MHz 486SX

■ \$1895

This is the hottest value on the market! You get 486 technology, including an 8K internal cache and burst mode, at a 386 price. And besides being faster than any 386 on the market, the 486SX/25 is upgradeable to 50MHz if you need increased performance in the future.

33MHz 486DX

■ \$2395

We recently increased performance and lowered the price of our best-selling, award-winning 486DX/33 by adding an ATI™ Graphics Ultra video card and a faster, 200MB Western Digital hard drive with 13ms access time. At \$2,395, the price/performance ratio on this machine is hard to beat. Plus, you can upgrade this system to 66MHz.



50MHz 486DX2

■ \$2695

Gateway 2000's new 486DX2/50 systems, ISA and EISA, incorporate Intel's speed-doubler technology. The internal core of the DX2 processor executes at 50MHz while communicating with the external memory bus at 25MHz. Our benchmarks show a 35% increase in performance over a 33MHz 486DX.

This system also has the new, faster Western Digital 200MB hard drive and the high-performance ATI Graphics Ultra video card.

50MHz 486DX2 EISA

■ \$3695

Our EISA system comes standard in a floor-standing tower model, and includes a large, fast SCSI drive and an EISA SCSI controller as standard equipment. RAM cache is expandable to 256K.

66MH 486DX2

■ Call for details.

486 SYSTEMS

Gateway 2000 systems come fully configured with all the performance features you want, including two floppy drives, a programmable 124-key AnyKey™ keyboard, a Microsoft® mouse, MS-DOS® 5.0, Windows™ 3.1 and your choice of one application software option. See the back pages of this ad for complete configurations and information about software options, upgrades and peripherals.

 **GATEWAY2000**
You've got a few on the loose.



GATEWAY 2000 NOTEBOOKS PUT YOU IN RACING FORM

The Nomad Series

Our small, lightweight Nomad notebook computers let you take desktop computer performance anywhere you go. Nomad models come with VGA graphics, a FieldMouse™ (portable pointing device), built-in floppy drive, and an 80 or 120MB hard drive, depending on the model. A patented power-management system gives you hard-to-beat battery life benchmarks — over six hours of operation from a single battery on the 25MHz 486DX system!

The Nomads have a bright, crisp, backlit, 10-inch triple supertwist VGA screen — resolution is 640 x 480, 64 gray scale, on the LCD. With simultaneous video, you can also display on an external monitor.

All these features ... and the Nomads are made in the U.S.A.!

Nomad 325SXL ■ \$1995

25MHz, 386SXL processor

■ 4MB RAM ■ 80MB hard drive

Nomad 420SXL ■ \$2695

20MHz, Intel® 486SXLP processor

■ 4MB RAM ■ 80MB hard drive

Nomad 425DXL ■ \$3495

25MHz, Intel 486DXLP processor

■ 4MB RAM ■ 120MB hard drive

For The Power User On The Go

Nomad Combo ■ \$3995

Since the Nomad 425DXL has all the power of a 486DX desktop system, it's the ideal portable/desktop combination system! Save with this combo package!

Combo Highlights: Nomad 425DXL ■ 15" CrystalScan 1572FS color monitor

■ programmable 124-key AnyKey™ keyboard



The HandBook™

If you like to travel light, you can't go wrong with the HandBook. It weighs only 2.75 pounds and measures roughly 6 x 9 inches — smaller than this magazine! Yet it has 286-class performance and real PC features including a bright, backlit screen, a bonafide 40MB hard drive and a comfortable keyboard (no chiclet keys). Downloading information from your HandBook to your office computer is easy with the serial cable and file transfer software provided.

HandBook ■ \$1295

For The Executive On The Go

HandBook Combo ■ \$3995

Combine the portability of our HandBook with the power of our 33MHz 486 desktop system with communication capabilities — and you have a terrific combo, Gateway value-priced!

Combo Highlights: HandBook with 2,400 bps external modem and communication software

■ 33MHz 486DX system with 120MB IDE hard drive ■ TelePath™ fax/modem package

PORTABLES



GATEWAY 2000 ADDS A FREE SOFTWARE BONUS

Choose Your Free Software Option

With the purchase of any Gateway 2000 mini desktop, desktop or tower computer system, you receive your choice of one application software option at no additional cost. We'll install your software on your hard drive, optimally configured for your system and Windows, and provide master diskettes and manuals. You may also purchase a second application software option, pre-installed, at extremely competitive prices.

Installation and setup errors are responsible for over one-third of all software problems. You can eliminate that possible source of problems by purchasing your system from Gateway with software pre-installed, tested, and ready to run the moment your system arrives. Add that advantage to the hard-to-beat prices, and Gateway is the only logical choice for PCs and software!

Choose one of the following application software options:

Option #1-Microsoft Excel for Windows™ 4.0

■ New version of this powerful spreadsheet, includes online help for Lotus 1-2-3® users



Option #2-Microsoft Word for Windows™ 2.0

■ Best-selling word processor for Windows. New version 2.0 adds online help for WordPerfect® users



Option #3-Microsoft PowerPoint for Windows™ 3.0

■ Easy-to-use desktop presentations program creates high-quality overheads and 35mm slides



Option #4-Borland Paradox™ 4.0

■ The award-winning database from Borland



Option #5-The Entrepreneur Pack

■ Includes the latest Windows versions of Microsoft Works™, integrating word processing, spreadsheet, and database in one easy-to-use program; Microsoft Publisher™ for creating page layouts; Microsoft Money™ to help you write checks, set budgets, track expenses; PLUS an Entertainment Pack with eight games, including Tetris®



Option #6- The Windows Programmer Pack

■ Includes everything you need to create programs for Windows: *Microsoft QuickC for Windows*™, *Windows Control Development Kit*™, *Windows Help Compiler*™ and *Windows Programmers' Online Reference*™.



Option #7-Microsoft Project for Windows™ 3.0

■ Flexible and easy project management program

NOTE: If you would rather replace an option with *Microsoft Office*™, it is available for \$175. This package includes *Word for Windows*, *Excel* and *PowerPoint*.



More Software At A Great Price!

The following applications are only available with the purchase of a system, pre-installed, or to Gateway customers.

Central Point™ Anti-Virus 1.2 For Windows ■ \$75

Central Point Backup™ 7.2 for Windows ■ \$75

The Norton Desktop™ 2.0 and Prisma YourWay 2.0 For Windows ■ \$95

These offers include the identical applications contained in retail packages but will not include the retail box. You get all master diskettes and manuals, shrink-wrapped and packaged in a Gateway 2000 box.

Peripherals

The 15-Inch CrystalScan 1572FS

You'll enjoy your new Gateway 2000 computer even more if you choose the new 15-inch CrystalScan color monitor option. The CrystalScan 1572FS has a flat, square, non-glare screen to reduce distortion around the corners and provide edge-to-edge display area.



The CrystalScan 1572FS is an upgrade option only with the purchase of a 386DX or 486 system for an additional \$195.

The Gateway 2000 TelePath™ Fax/Modem

The Gateway 2000 TelePath is a 14,400 bps mode, V.32bis, with 9,600 bps fax capability. The TelePath comes with WinFax Pro™, Crosstalk™ for Windows, Qmodem™ and a free 30-day basic services CompuServe® membership — all for only \$195!

■ Fax mode: V.17, V.29 and V.27ter

■ Data mode: V.32bis, V.32, V.22bis, V.22, V.21, Bell 212A and 103, V.42 and MNP 2-4 error correction, V.42 bis/MNP 5 data compression

Included With Every System:

■ One-year limited warranty ■ 30-day money-back guarantee ■ Lifetime toll-free technical support ■ Free on-site service to most locations (*factory service only for notebooks*) ■ Free bulletin board technical support ■ C.O.D. terms and major credit cards honored ■ Net 30-day credit terms and leasing options available to qualified commercial customers

*Sorry — we sell peripherals only with the purchase of a Gateway 2000 system, or to people who are already Gateway 2000 customers. For fastest service, call our new direct line for the **Component Add-On Division: 800-252-3333**. Please have your customer ID handy when you call.*



GATEWAY2000

"You've got a friend in the business."

GATEWAY 2000 WINNERS CIRCLE

PORTABLES

HANDBOOK™

- 286 Class Performance
- 1MB RAM upgradeable to 3MB
- 40MB Hard Drive
- Backlit 7.6" CGA Screen
- Size 5.9" x 9.75" x 1.4", 2.75 Lbs.
- 4.5-Hr.* NiMH Battery & AC Pack
- 1 Parallel/1 Serial Port
- 78-Key Keyboard
- MS DOS 5.0, File Transfer Software & Serial Download Cable
- Introductory Bonus Pack
- Carrying Case

\$1295

NOMAD 325SXL

- 25MHz, 386SXL Processor
- 4MB RAM
- 1.44MB 3.5" Drive
- 80MB IDE Hard Drive
- Backlit 10" VGA Screen, 64 Grays
- Simultaneous Video with 256K
- Size 8.5" x 11" x 1.8", 5.8 Lbs.
- 7-Hr.* NiCad Battery & AC Pack
- 1 Parallel/1 Serial Port
- 79-Key Keyboard
- FieldMouse™ Pointing Device
- MS DOS 5.0 and Windows™ 3.1

\$1995

NOMAD 420SXL

- 20MHz, Intel® 486SXLP Processor
- 4MB RAM
- 1.44MB 3.5" Drive
- 80MB IDE Hard Drive
- Backlit 10" VGA Screen, 64 Grays
- Simultaneous Video with 1MB
- Size 8.5" x 11" x 1.8", 5.8 Lbs.
- 6-Hr.* NiCad Battery & AC Pack
- 1 Parallel/1 Serial Port
- 79-Key Keyboard
- FieldMouse Pointing Device
- MS DOS 5.0 and Windows 3.1

\$2695

NOMAD 425DXL

- 25MHz, Intel 486DXLP Processor
- 4MB RAM
- 1.44MB 3.5" Drive
- 120MB IDE Hard Drive
- Backlit 10" VGA Screen, 64 Grays
- Simultaneous Video with 1MB
- Size 8.5" x 11" x 1.8", 5.8 Lbs.
- 6-Hr.* NiCad Battery & AC Pack
- 1 Parallel/1 Serial Port
- 79-Key Keyboard
- FieldMouse Pointing Device
- MS DOS 5.0 and Windows 3.1

\$3495

DESKTOPS

25MHz 386SX

- Intel 386SX Processor
- 4MB RAM
- 1.2MB & 1.44MB Drives
- 80MB 17ms IDE Cache Drive
- 16-Bit SVGA with 512K
- 14" CrystalScan 1024 Color VGA Monitor
- 1 Parallel/2 Serial Ports
- 124-Key AnyKey™ Keyboard
- Microsoft® Mouse
- MS DOS 5.0 and Windows 3.1
- Choice of Application Software

\$1495

25MHz 486SX

- Intel 486SX Processor
- 4MB RAM
- 1.2MB & 1.44MB Drives
- 120MB 15ms IDE** Cache Drive
- ATI™ Graphics Ultra Video
- 14" CrystalScan 1024NI Color VGA Monitor
- 1 Parallel/2 Serial Ports
- 124-Key AnyKey Keyboard
- Microsoft Mouse
- MS DOS 5.0 and Windows 3.1
- Choice of Application Software

\$1895

33MHz 486DX

- Intel 486DX Processor
- 64K Cache RAM
- 4MB RAM
- 1.2MB & 1.44MB Drives
- 200MB 13ms IDE** Cache Drive
- ATI Graphics Ultra Video
- 14" CrystalScan 1024NI Color VGA Monitor
- 1 Parallel/2 Serial Ports
- 124-Key AnyKey Keyboard
- Microsoft Mouse
- MS DOS 5.0 and Windows 3.1
- Choice of Application Software

\$2395



50MHz 486DX2

- Intel 486DX2 Processor
- 64K Cache RAM
- 8MB RAM
- 1.2MB & 1.44MB Drives
- 200MB 13ms IDE** Cache Drive
- ATI Graphics Ultra Video
- 14" CrystalScan 1024NI Color VGA Monitor
- 1 Parallel/2 Serial Ports
- 124-Key AnyKey Keyboard
- Microsoft Mouse
- MS DOS 5.0 and Windows 3.1
- Choice of Application Software

\$2695

***Enhanced IDE with RIDE (Rapid Integrated Drive Electronics)*

50MHz 486DX2 EISA

- Intel 486DX2 Processor
- 128K Cache RAM
- 8MB RAM
- 1.2MB & 1.44MB Drives
- 340MB 15ms SCSI Cache Drive
- 32-Bit EISA SCSI Controller
- 16-Bit SVGA with 1MB
- 14" CrystalScan 1024NI Color VGA Monitor
- 1 Parallel/2 Serial Ports
- 124-Key AnyKey Keyboard
- Microsoft Mouse
- MS DOS 5.0 and Windows 3.1
- Choice of Application Software
- Tower Model is Standard

\$3695

66MHz 486DX2

- Call for details

** Battery life was measured using PC Magazine's Battery Rundown Test with power management enabled. Actual results may vary depending on configuration and applications.*

All prices and configurations are subject to change without notice. Prices do not include shipping. Components, peripherals and software are sold only with the purchase of a system, or to customers who already own Gateway 2000 systems. Some limitations apply.



Printed on recycled paper



8 0 0 - 5 2 3 - 2 0 0 0

610 Gateway Drive • P.O. Box 2000 • North Sioux City, SD 57049-2000 • 605-232-2000 • Fax 605-232-2023

Sales Hours: 7am-10pm Weekdays, 9am-4pm Saturdays (CDT)

©1992 Gateway 2000, Inc. AnyKey, HandBook, FieldMouse and TelePath are trademarks of Gateway 2000, Inc. Intel is a trademark of Intel Corporation. All other brands and product names are trademarks or registered trademarks of their respective companies.

■ Multimedia

Pro AudioSpectrum 16 Shows Off 16-Bit Sound

BY JOHN QUAIN

The first generation of affordable audio boards for multimedia PCs had one thing in common: they sounded terrible. Media Vision's second-generation, \$349 Pro AudioSpectrum improves on the past by bringing true CD-quality 16-bit sound to the PC.

Previously, most audio cards used 8-bit digital-to-analog converters (DACs), limiting the dynamic range of audio played through them. Even when a 44.1 kHz sampling rate was used, 8-bit music sounded as though it came through a tin can.

The Pro AudioSpectrum 16 eliminates that problem by using a full 16-bit sample size with a sampling rate of 44.1 kHz for playback and recording. The three-quarter-length 16-bit ISA card includes a 4-watt-per-channel amplifier and facilitates sound recording at rates from 4 kHz to 44.1 kHz with 2 to 1 compression. The board is also MPC compatible.

Internal connections include an audio port for a CD-ROM drive and a SCSI connector. External connections on the card include three 1/8-inch jacks: a stereo output (for speakers or headphones), a line input (for a CD or tape source), and a microphone jack. A joystick port doubles as the MIDI port.

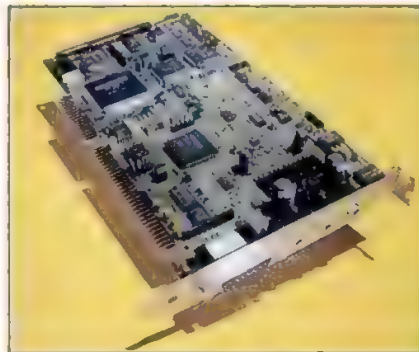
MIDI users should note that instead of a two-operator FM synthesizer, Media Vision has installed a Yamaha YMF262 FM synthesizer. This won't satisfy the demands of professional users, but it improves the realism of synthesized instruments. The MIDI synthesizer can play 18 simultaneous instrument sounds or 15 instruments and 5 drum sounds.

Media Vision provides several software modules with the board, including Windows 3.1

utilities that let you adjust the tone, balance, and volume of the board's output, as well as mix various sound sources. For more sophisticated sound editing, a DOS program enables you to control pans, amplitude changes, reverb, and echo effects. Other DOS programs include a text-to-speech synthesizer and a MIDI sequencer.

In hands-on tests, the Pro AudioSpectrum 16 was audibly superior to the first-generation of sound boards. The tinny high-frequency "folding" distortion created by 8-bit boards is com-

pletely eliminated on this 16-bit card. With a rated frequency response of 30 Hz to 20 kHz (± 3 dB), the Pro AudioSpectrum 16 is able to play CDs on a con-



16 BITS: The Pro AudioSpectrum 16

connected CD-ROM drive with a sound quality very close to that of home stereo CD players.

Our only grievance concerns the board's 4-watt amplifier stage. Adding an amplifier to an

internal expansion card tends to add noise, and the Pro AudioSpectrum 16 is no exception.

The Pro AudioSpectrum 16 package is a substantial improvement over earlier boards. Those looking to add high-fidelity sound to their multimedia presentations should be pleased with this board's capabilities.

- **List Price:** *Pro AudioSpectrum 16*, \$349; *SCSI cable kit*, \$59. Requires: 640K RAM, 3MB hard disk space, DOS 3.1 or later, external speakers. Microsoft Windows 3.0 with Multimedia Windows or Windows 3.1, CD-ROM drive, and microphone recommended. Media Vision Inc., 47221 Fremont Blvd., Fremont, CA 94538; 800-845-5870, 510-770-8600; fax, 510-770-9592.

Circle 417 on reader service card

■ Network Utilities

Share Data Via DDE with NetWorks! Connect

BY M. KEITH THOMPSON

Symbiotics' \$395 NetWorks! Connect lets networked Windows users share data among applications by using Windows' DDE (Dynamic Data Exchange) as the means of communication. For groups needing to share the work on a project, its usefulness is obvious.

Imagine that a group is putting together a manual. A writer is working on the text in WordPerfect for Windows, and an artist is using CorelDRAW for the illustrations. The writer uses DDE to connect the drawings on the artist's computer to the manual, and when the drawings are complete, the manual updates automatically.

Although NetWorks! Connect will work with or without a network operating system running, the computers must be physically connected with a supported network card from 3Com, Exos, Novell, or Western Digital.

Setup and administration require some networking experience. NetWorks! Connect uses TCP/IP to communicate with the other computers on the network, so the administrator must assign each computer on the network an address.

NetWorks! Connect makes it easy for users to pass data to other users on the network. The program uses standard Windows pull-down menus and buttons. You mark and select text or graphics as you normally would, and NetWorks! Connect puts your data on the network with your name. To protect your clipboard from remote access, you can turn linking off.

NetWorks! Connect extends the Paste and Paste Link functions of Windows programs across the network. The Paste function copies data from a remote computer. You simply select the Copy or Link button from the NetWorks! Connect window and select the user's name from the list of available

computers. Then NetWorks! Connect copies the data from the remote user's clipboard to your normal Windows Clipboard, and you then place it where you want it with the Windows Paste command.

Just as Windows lets you reference data in another program with the Paste Link command, NetWorks! Connect lets you Paste Link to information on a coworker's computer. When the information changes on your coworker's computer, your program is updated automatically.

DEVELOPMENT TOOL

NetWorks! Developer, the tool used to create NetWorks! Connect, provides application developers with the tools necessary to create true distributed applications across multiple platforms. At \$2,495, NetWorks! Developer includes NetWorks! Connect and provides a complete network development tool.

- **List Price:** *NetWorks! Connect*, \$395; *NetWorks! Developer*, \$2,495. Requires: 2MB RAM, Windows 3.0 or later. Symbiotics Inc., 725 Concord Ave., Cambridge, MA 02138; 800-989-9174, 617-876-3635; fax, 617-876-0157.

Circle 418 on reader service card

■ Mass Storage

Pinnacle Micro Ushers in Second Generation of Faster Optical Drives

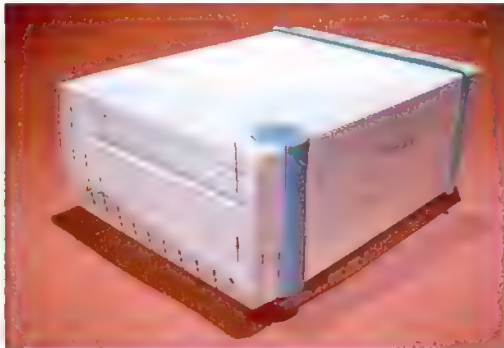
BY JOHN QUAIN

Ever since optical disks first appeared, PC users have dreamt of having unlimited, removable, rewritable storage on CD-size disks. But for all their potential, magneto-optical (MO) drives have lagged far behind hard disks. Pinnacle Micro's PMO-650 is the first 5.25-inch MO drive to significantly narrow the performance gap.

With a list price of \$4,195, the PMO-650 is only for users who need to store and quickly retrieve gigabytes of data. The PMO-650 is able to store up to 595MB per cartridge (298MB per side); the package includes a choice of Future Domain or

Adaptec SCSI-2 adapters, one cartridge, and all needed cables.

On PC Labs' DOS Disk Access test, the PMO-650 turned in a 45.9-millisecond access time—



SPINNER: The PMO-650 optical drive.

far faster than the average 70.71 ms of MO drives we tested 18 months ago, but still not up to the 16.28-ms access time of a 310MB ESDI drive on a

Compaq Deskpro 386/25e. Further tests, however, better demonstrated the PMO-650's abilities in real-world situations.

Using DOS's XCOPY command to transfer 123MB from the ESDI drive to the PMO-650, the PMO-650 took 10 minutes 58 seconds to complete the task. Just 18 months ago, MO drives required from 30 minutes to an hour to perform a similar task.

Furthermore, copying the same data from one hard disk partition to the other on the ESDI drive took nearly as long: 9 minutes 5 seconds.

Transferring the 123MB from the PMO-650 back to the ESDI hard disk took 11 minutes 35 seconds, making it a candidate for primary storage needs.

To achieve this performance, the PMO-650 combines several innovations. Early MO designs were constrained by the size and weight of the head mechanism, which has a magnet and laser read/write assembly.

Using a technique called split

optics, Pinnacle has reduced the mass of the PMO-650's drive head by moving most of the heavy laser optics off of the read/write head and onto a fixed part of the drive. Pinnacle is the first company to use split optics in a 5.25-inch drive.

Pinnacle also has increased the rotational speed of the PMO-650. Earlier 5.25-inch MO drives spun as slowly as 2,400 rpm. The PMO-650 spins at 3,600 rpm and employs data buffering and queuing techniques to reduce access time.

Among optical drives, the PMO-650 delivers unparalleled performance, approaching that of a hard disk. Unfortunately, only corporate users needing gigabytes of storage will be able to justify the \$4,195 price tag.

• **List Price:** Pinnacle PMO-650 with SCSI adapter and one cartridge, \$4,195. Additional cartridges, \$199; internal drive kit, \$4,095. Requires: DOS 3.3 or later, one 16-bit ISA expansion slot. Pinnacle Micro Inc., 19 Technology Dr., Irvine, CA 92718; 800-553-7070, 714-727-3300; fax, 714-727-1913.

Circle 424 on reader service card

■ Graphic Utilities

HiJaak for Windows Makes Your Graphical Images Picture Perfect

BY JAMES KARNEY

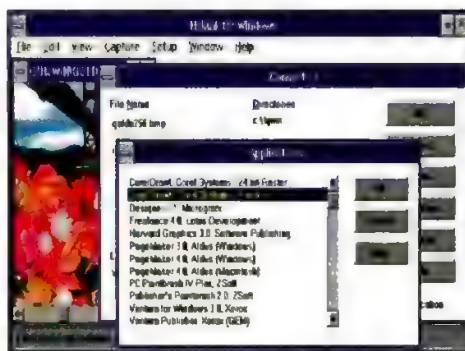
HiJaak for Windows (\$249) is an excellent Windows translation of Inset Systems' popular DOS-based conversion utility for graphical file formats.

As in the DOS version, you can view and enhance 23 bitmap and 15 vector graphic file formats, ranging from the Amiga's .IFF to WordPerfect's .WPG, but unlike the DOS version, you can view several files at once. Image manipulations include rotation, resizing, and color reduction as well as contrast and brightness adjustment. Color palettes range from monochrome to 24-bit true color. If your display system is limited to 256 colors, HiJaak lets you view

images using a fixed or dynamic palette.

Once the image has been fine-tuned, you can perform raster-to-raster, vector-to-vector, and vector-to-raster conversions. These can be done generically by file type, or by specifying the target application (such as CorelDRAW or Ventura Publisher). Images can also be transmitted by 24 different fax cards and modems. HiJaak can act as a Windows 3.1 OLE server, adding to your options for moving graphics between programs.

Windows screen captures are straightforward. Just load the program, set up the capture



CONVERT: HiJaak's conversion options include a range of raster and vector formats.

screen, hit the designated hotkey, and name the file. Unfortunately, the key combinations all involve either the Ctrl or Alt keys, making it impossible to capture some drop-down menus. DOS screen captures are obtained by running a

separate program called DOSCap and invoking a menu with a Ctrl-Alt key combination. Text screens can be saved in vector, .PCL, and EPS formats.

We experimented with a series of screen captures and file conversions. Most worked perfectly, but a CGM test file failed to load in color. HiJaak for Windows fax conversions of TIFF and Microsoft Word files, sent using an Intel Satisfaction card, showed excellent detail and preserved the original fonts and formatting.

• **List Price:** HiJaak for Windows, Version 1.0, \$249. Requires: 5.5MB hard disk space, Windows 3.0 or later. Inset Systems, 71 Commerce Dr., Brookfield, CT 06804; 203-740-2400.

Circle 423 on reader service card

A group of five people, three women and two men, are standing in a row. Each person is holding a software box. From left to right: a woman holds a box with a red and white design; a man holds a box with a red and white design; a woman holds a box with a red and white design; a man holds a box with a red and white design; and a man holds a box with a blue and white design. The background is a gradient of orange and red.

Borland

Four out of five 1-2-3 users prefer Quattro Pro

When a group of Lotus 1-2-3 users compared Quattro® Pro 4.0 and 1-2-3 side-by-side, they made a startling discovery: four out of five Lotus users preferred Quattro Pro. They found it easier to use, richer in features, and more productive. The study was done by Usability Sciences Corporation, a highly regarded independent testing laboratory. (Coincidentally, this is the same company Lotus uses to do its usability studies.)

Borland dumps old Lotus menus, keeps macro compatibility

About 90% of Quattro Pro users use only the Quattro Pro native menus. They no longer use the old Lotus slash key. And it's now obvious that Lotus doesn't want other companies supporting its outdated user interface either. Therefore, Borland has decided to give users what they prefer. Borland is now shipping Quattro Pro 4.0 with only the more efficient native menus—the ones users love. And Quattro Pro still has 1-2-3 file, publishing style, and macro compatibility.

The final mistake: Lotus goes it alone

Lotus' latest strategy of closing the menu-command standard is the final blow to users. After all, what is Lotus known for? *The best technology?* Certainly not. *The best spreadsheet?* Not even close. *Litigation rather than innovation?* Absolutely. And now Lotus is on the verge of losing its largest asset: users who have invested in the Lotus

Quattro Pro 4.0 is . . .

"... the best DOS spreadsheet you can buy."

PC/Computing, March 1992

"... the ultimate DOS spreadsheet."

PC Magazine, April 28, 1992

"... the best non-Windows spreadsheet . . ."

PC World, March 1992

"... the best DOS spreadsheet ever."

Office Technology Management, February 1992

"The best DOS spreadsheet in the world."

PC User (U.K.), March 24, 1992

menu standard. By making its menu system a closed standard, Lotus is not the only loser. You lose, because Lotus is apparently trying to eliminate your right to choose. Fortunately, you don't lose much, because 1-2-3 users prefer Quattro Pro's better design and Quattro Pro can still run their 1-2-3 macros.

Lotus closes standard, loses the war

So Lotus may have won a small battle by keeping a menu system to themselves, but they'll lose a very big war with their Berlin Wall customer strategy. Borland, on the other hand, has always believed that open standards promote competition, spur innovation, and grow markets.

Lotus and Ashton-Tate: history repeats itself

Ashton-Tate® tried to establish a closed standard too. They tried to force users into their camp and to keep out the competition through litigation. Borland's acquisition of Ashton-Tate reversed this. Borland dropped Ashton-Tate's lawsuit against Fox and paved the way for competing products from several companies. Customers have won, because they can freely choose other products compatible with the open dBASE® standard.

Quattro Pro: the best DOS spreadsheet

Quattro Pro has won 42 awards, dwarfing Lotus in side-by-side comparisons. And Quattro Pro 4.0 has been called the best DOS spreadsheet by leading computer trade publications. It's proof that competition works.

You be the judge

For a good lawyer, call Lotus' law firm.
For the best DOS spreadsheet, get Quattro Pro.

See your dealer today or call Borland at 1-800-331-0877, ext. 5729



B O R L A N D

Software Craftsmanship

Copyright © 1992 Borland International, Inc. All rights reserved. Quattro Pro, dBASE, and Ashton-Tate are registered trademarks of Borland International, Inc. BI 4529

CIRCLE 287 ON READER SERVICE CARD

■ Tape Backup

Iomega's TAPE250: A Miniature Marvel

BY WINN L. ROSCH

Hardly larger than the DC2000 cartridges it swallows, Iomega's TAPE250 tape system marks the ultimate in modern tape backup miniaturization. At 1 by 4 by 5.7 inches (HWD), it's the first minicartridge drive tiny enough to fit a 1-inch tall 3.5-inch drive bay. It's also the first of a promised series of minicartridge systems from Iomega, and the company's first step beyond its traditional Bernoulli Box product line.

Packing a nominal 250MB (using data compression) on a DC2120 minicartridge under the QIC-80 standard, the TAPE250 also reads embedded-servo tapes created under Irwin Magnetic's proprietary standard. At \$299 (under \$240 on the street) for the most basic package, the TAPE250 offers the right combination of price, size, performance, and compatibility to seriously challenge Colorado Memory System's in-

dustrial-leading Jumbo 250 tape system.

As with all QIC-80 drives, the TAPE250 plugs into a floppy disk port, but the Iomega system is both smarter and easier to install than most tape drives. The drive's circuitry automatically selects itself as the last drive in a system—even as the third drive hitched to a floppy-disk controller that otherwise handles only two. It accepts both the 500 kilobits per second data-transfer rate of high-density controllers and the 1 megabit per second rate of extra-density floppies and backup accelerator cards.

To command the TAPE250, Iomega supplies Central Point Backup, Version 7.0, a full-featured menu-driven system with automated batch capabilities. A graphics-based Windows version is also in-

cluded. Although well-regarded, the backup program was not the same gem as the hardware. It proved troublesome in formatting tapes and advised using a program not included with the package (DISKFIX) when it encountered disk errors.

The TAPE250 system in-



250MB-SMALL: The 3.5-inch Iomega TAPE250.

stalls as easily as a floppy disk drive. Plug it in, run the automatic software installation, and you'll be making tape backups in minutes (unless you buy unformatted tapes, which take

about 2 hours to prepare).

As with all QIC-80 products, the performance of the TAPE250 system varies with the microprocessor power of the computer host, the floppy disk interface speed, and the control software.

In our 386-based test system, the TAPE250 yielded a commendable 2.9MB per minute throughput to tape using the host's native 500 Kbps floppy controller with a 27 percent compression ratio.

Although its software could use a bit of polish, the TAPE250 package generally performs on par with the best mini-cartridge systems.

• **List Price:** TAPE250 Insider, \$299; TAPE250 Insider Half-Height, \$349; TAPE250 PC Powered, \$499; Fast Floppy Controller AT, \$150; Additional

Extender Cards for PC Powered, \$75. Iomega Corp. 1821 West 4000 South, Roy, Utah 84067; 800-456-5522, 801-778-1000; fax, 801-778-3450.

Circle 421 on reader service card

■ Data Compression

XtraDrive Doubles Your Hard Disk and Uninstalls Easily

BY GREG PASTRICK

Integrated Information Technology takes a novel approach to doubling hard disk space with its \$99 XtraDrive on-the-fly compression software. Compared with the polished, feature-rich technology of AddStor's SuperStor or Stac Electronics' Stacker, IIT's method is direct and workmanlike, but no less effective in increasing drive capacity while compressing and decompressing files transparently. Its features and limitations make it best for use on notebooks, and IIT's compression method warrants a bit of caution.

XtraDrive doubles the ca-

capacity of a hard disk by replacing the DOS boot record at the BIOS level and routing INT 13 calls through its own device driver and interrupt handler.

The program effectively creates an additional drive equal in capacity to the installed hard disk, but you can create only one new virtual drive for each partition up to the maximum allowed by DOS. While you get greater compressibility of files on the virtual drive built with 8K clusters, it offers overall total compression ratios competitive with rivals.

DEVICE CONFLICTS

On the downside, loss of or damage to the XtraDrive device

driver prevents access to the whole hard disk. With SuperStor or Stacker, driver damage prevents access only to the compressed drive space. The potential for system-crashing boot conflicts also exists with XtraDrive, since the program loads itself into the high end of conventional memory before releasing that space to DOS and other applications vying for space. A boot disk with the XtraDriver device driver is your best security blanket.

XtraDrive separates itself from the competition with another safety net. It includes an uninstallation program that returns the system cleanly to its preinstallation state. Executing the uninstall utility returns AUTOEXEC.BAT and CONFIG.SYS to their original condition and restores the DOS boot record without reformatting or loss of data.

BEST FOR PORTABLES

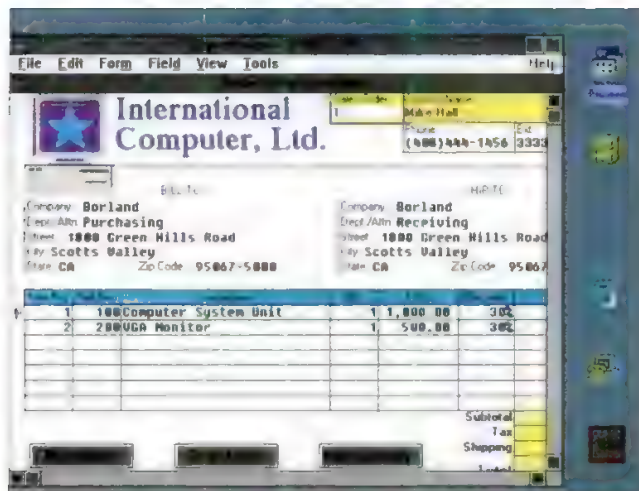
While XtraDrive offers an inexpensive alternative to SuperStor and Stacker, its blunt approach and minimal features make it best for portable systems. What's more, the program supports only the installed hard disk and no other fixed or removable media. Primarily in the hardware business, IIT is soon to release a \$199 16-bit coprocessor board based on its compression technology. An update of the XtraDrive software, including support for removable media and added utilities, will also be released at that time.

• **List Price:** XtraDrive, Version 1.0, \$99. Requires: 39K without EMS, 23K with EMS; DOS 3.0 or later. Integrated Information Technology Inc., 2445 Mission College Blvd., Santa Clara, CA 95054; 800-832-0770, 408-727-1885; fax, 408-727-1357.

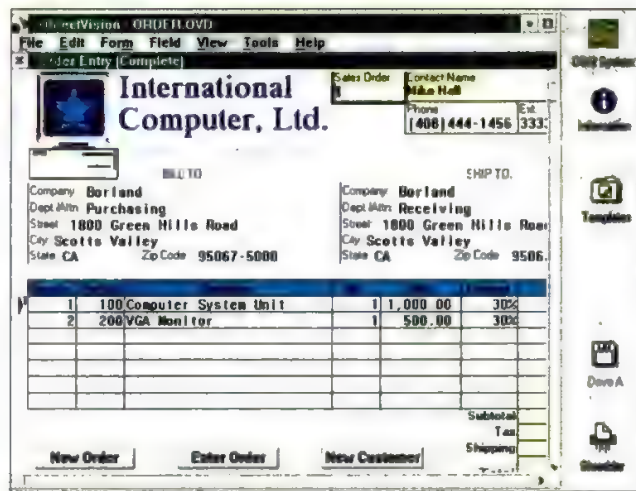
Circle 422 on reader service card

Q: What do Windows and OS/2 have in common?

New Version



ObjectVision for Windows

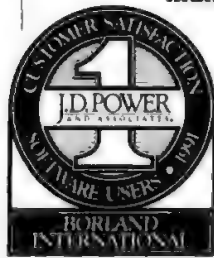


ObjectVision for OS/2

A: Your ObjectVision applications.

Borland's ObjectVision® brings Microsoft® Windows and OS/2® users together. Only ObjectVision allows you to write an application *once* for use under both Windows and OS/2. And seamlessly access the same data, regardless of platform. That's because ObjectVision, the world's easiest tool for creating Windows applications, is now also available for OS/2.

Visual programming makes it easy



Tied: #1 Application Software™
Publisher in Customer Satisfaction™

Using revolutionary visual programming techniques, ObjectVision makes it easy for the people who know the business issues to develop and maintain their own graphical software applications without programming.

Creating Windows or OS/2 applications is as easy as A-B-C. Simply:

- A.** Draw your application interface using the convenient form tool.
- B.** Apply your business rules visually.
- C.** Connect your application to your existing database. Or create your own database.

In Windows and OS/2, ObjectVision makes it easy to create, modify and run your own interactive applications. And the OS/2 version gives you easy access to REXX as well as DLLs.

Easy access to data

ObjectVision is the ideal front end to your data because it integrates information from different databases under one familiar, graphical user interface. Your ObjectVision applications can easily connect to information stored in Paradox®, dBASE®, Btrieve, Database Manager and ASCII formats.

FREE runtime version

Because a runtime version is included *free*, it's easy to distribute your customized applications throughout your company. With ObjectVision, fully interoperable Windows and OS/2 applications are here today!

See your dealer today to get your own copy of ObjectVision for Windows or OS/2, OR call **1-800-331-0877, ext. 6619** to request your ObjectVision for Windows

FREE TRIAL DISK

In Canada, call **1-800-461-3327**



B O R L A N D
The Leader in Object-Oriented Programming

Copyright © 1992 Borland International, Inc. All rights reserved. ObjectVision, Paradox and dBASE are registered trademarks of Borland International, Inc. OS/2 is a registered trademark of IBM. Microsoft is a registered trademark of Microsoft Corporation.
*1991 J.D. Power and Associates 1991 Computer End User Satisfaction Study for Application Software Publisher Phase IV: Business End User Summary. Responses from Business End Users at 4,396 business sites. BI 1552

CIRCLE 295 ON READER SERVICE CARD

Borland's Why it's smart

The #1-selling database

dBASE® is the #1-selling relational database in the world. It offers the most complete set of tools for developers and users to access and manage their corporate data.

Today, more than three million people use it to build applications that help them run their businesses and maintain a competitive edge. And with the world's largest community of trainers, consultants, and add-on software extensions, it's little wonder that dBASE is the standard for corporate applications development. Now, new dBASE IV version 1.5 makes it smarter than ever to go with #1.

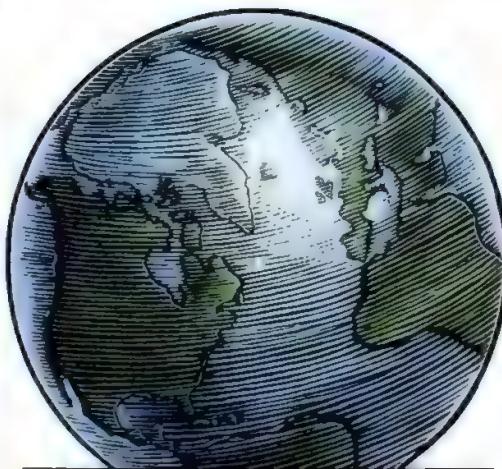
New! Version 1.5 is here

Now there's an easier-to-use, faster, and more powerful dBASE. It's packed with the features you've asked for most, making it smarter than ever to use the world's #1 PC database.

Working smarter is faster



With new dBASE IV, you get the job done faster because you work smarter. Smarter because new **IQ!**™ optimization technology



The Worldwide Standard

What's new in dBASE IV v1.5:

For Users

- Mouse support
- Editable multi-file view
- Calculated field linking
- QBE summary operators and pick lists
- Automatic install
- New optimization technology—**IQ!**
- Save query indexes

For Developers

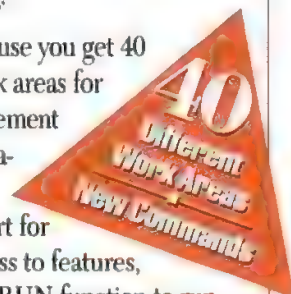
- INDEX functions
- 40 work areas
- Template Language included
- Enhanced BLANK support
- Browse/Edit organize menu toggle
- Conditional compilation
- Low-level file I/O
- Open architecture Control Center
- Enhanced RUN function
- Multiple and global procedure libraries

automatically selects the fastest method to retrieve your data. Smarter because you can create tables, forms, reports, queries, and menus in record time—without programming.

Smarter because you get 40 different work areas for easier management of large applications. Plus mouse support for fingertip access to features, an enhanced RUN function to run popular DOS applications from within dBASE, and comprehensive multi-user capabilities. All of which means you maintain tight data integrity, more flexibility and more support than ever before.

Advanced design tools build applications faster

dBASE IV's easy-to-use Control Center comes complete with an innovative set of design tools, including report, form, and label generators that help you create your applications quicker. And the Control Center's open architecture makes it easy to enhance or customize your own applications by incorporating third-party add-on products available for dBASE.



dBASE IV[®]

er to go with #1

Faster applications development

The industry-standard dBASE language comes with a host of improvements that speed development:

- Integrated debugger and a built-in applications generator
- More than 40 new commands, functions, and keywords—Template Language now included
- C language-like low-level file I/O
- IBM[®] SAA-compliant SQL
- Advanced BLANK support

100% commitment to dBASE

Now that it's from Borland, your investment in dBASE is secure. dBASE gives you all the benefits of complete compatibility and application portability that come with the database standard. And Borland is the acknowledged database technology innovator, so you're on the winning team for the long haul. Get dBASE IV v1.5 today. You'll see why it's smarter than ever to go with #1.



Get **NEW dBASE IV v1.5** today and receive more than \$250 in additional software,



FREE!

See your dealer or call now
1-800-331-0877, ext. 6441
In Canada, call 1-800-481-3327.



Send me my FREE Pro Pack Software!

Purchase dBASE IV v1.5 before September 30, 1992, and Borland will give you Central Point Software's Backup and Anti-Virus programs *free*.^{*} That's a suggested retail value of \$258.

Check DOS disk size required: ☐ 5 1/4" ☐ 3 1/2"

dBASE IV v1.5 Serial # _____

Name _____

Company _____

Address: _____ (We cannot ship to P.O. boxes.)

City/State/Province _____

Zip/Postal Code: _____ Phone: () _____ FAX: () _____

COMPLETE this coupon. **ATTACH** a copy of your sales receipt (or a copy of purchase order and billing invoice) **AND ENCLOSE \$9.00 U.S.** for shipping and handling (check or money order payable to Borland International, Inc.).

Send to: Borland's Pro Pack Offer, P.O. Box 7243, San Francisco, California 94120-7243.

^{*}Offer good in U.S. and Canada only on dBASE IV v1.5 purchases between June 1 and September 30, 1992. Only original coupons will be accepted. No responsibility is assumed for lost, late, misdirected, or destroyed mail. Please allow 4-6 weeks for delivery. Subject to all local, state, and federal regulations. Void where prohibited. Offer not valid for Upgrades, Competitive Upgrades, LAN Packs, Volume Packs, or any other Borland promotion except dBASE IV v1.5 products. Distributors and resellers not eligible to participate. Central Point is a registered trademark of Central Point Software.

BORLAND

dBASE IV from Ashton-Tate[®], a Borland Company

CIRCLE 285 ON READER SERVICE CARD

■ Presentation Graphics

DeltaGraph and Stanford Take On Technical Charting

BY ROCK MILLER

Technical professionals are frequent presenters, but their data requirements often exceed the capabilities of most presentation packages. DeltaGraph Professional for Windows from DeltaPoint and Stanford Graphics for Windows from 3-D Visions (both \$495) aim to be one-stop toolkits for such users.

DELTAGRAPH PROFESSIONAL FOR WINDOWS, VERSION 2.0

DeltaGraph's primary focus is on the meat and potatoes of technical charting. It has a few specialty technical plots (polar charts, spider charts) and with a little work it can be made to do histograms, but its strength is in the basics: 2-D and 3-D scatter charts, bubble charts, and contour charts and surface charts in wireframe and filled versions.

The program also does rapid bivariate curve fits and error bars, and has a full selection of 2-D and 3-D business charts as well as a few novelties such as time lines, org charts, and a ternary chart that graphs points along three axes.

You can select charts from the menus or a chart gallery, but you'll find it a lot easier to draw on the extensive collection of fully styled charts. Using the chart libraries couldn't be simpler: You just select the thumbnail you want and drag it into your chart window. You can save your custom chart designs by a simple reverse process.

DeltaGraph's cleanly designed data sheet is constructed of a "notebook" with multiple named "data pages," or spreadsheets. The design is handy for grouping and organizing multiple data sets, and although you can't exclude rows and columns individually, it's easy to cut,

paste, and sort them. You can transform any column by means of a formula builder, import and export data in a variety of formats, and link data tables from Windows spreadsheets via DDE (Dynamic Data Exchange) or OLE (Object Linking and Embedding)—a major benefit if you do data management within your spreadsheet.

The resulting charts look quite nice, with interactive point-and-click control over the placement and attributes of all elements. An especially good touch is the program's use of dingbats for scatter-chart point symbols. It also does a fine job putting perspective chart labels on 3-D charts, though axis labels wrap ungracefully.

The decent quality of the results makes DeltaGraph's physical limitations all the more distressing. Its performance is sluggish (especially with data sets over a few thousand points), and complete redraws occur far too frequently. Worse, our testing was beset with bugs, including a few that threw us out of the program and lost

OLE links. Some embedded charts suffered from clipping problems as well.

The noncharting parts of the program are often less than optimal. You can apply one or more common backgrounds to slides and use chart templates, but there are no multiple masters or other style aids.

Text charts are hard to scale and require a lot of tinkering. Some of the drawing tools are poorly designed, and you can neither break up nor rotate imported clip art.

Finally, there are problems in output. The program offers the option of using its own custom PostScript routines for greater precision, but our test output showed a number of glitches. By using this option you lose direct support for TrueType fonts (Adobe Type Manager is included for screen fonts and symbols).

You can ensure the right aspect ratio for slides, but there's no setting to scale the image to the page or to center it, so color proofs are either off-center or cut off. Though DeltaGraph is

acceptable for basic technical charts, don't expect it to be a good presentation tool.

STANFORD GRAPHICS FOR WINDOWS, VERSION 2.0

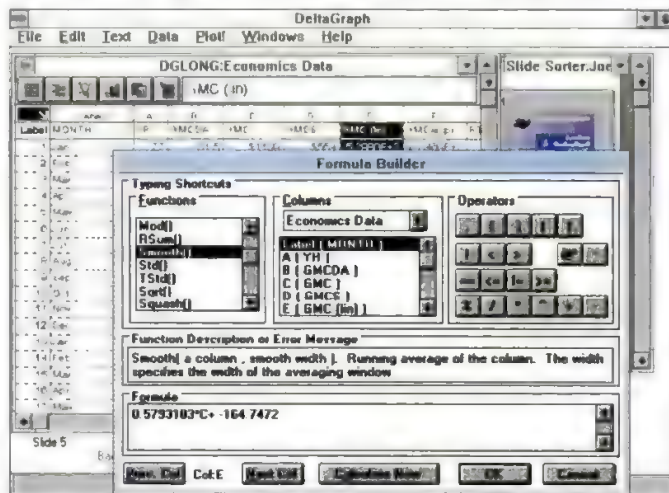
In contrast to DeltaGraph, Stanford Graphics is aimed at engineers, scientists, and statisticians with heavy-duty technical charting needs. It offers a mouthwatering collection of unusual chart types: not just scatter, bubble, contour and surface plots, but such exotica as box-whisker plots, star plots, Smith charts, spectral plots, and 2-D and 3-D vector plots.

Unlike DeltaGraph, Stanford generates histograms directly from a set of cases, and it even sorts values for Pareto charts (though only from aggregated data). All are readily accessible in a thumbnail chart gallery, to which you can add your own chart styles.

Stanford is equally rich in data management and analysis tools. The program can open an unlimited number of multipage data sheets, which may be linked to disk files or pastelinked via DDE. Its powerful formula builder is far richer in functions than DeltaGraph's, especially in statistical and analysis functions, and you can assign formulas to individual cells, columns, or rows.

In addition to the full range of curve fits, you can also do interpolation, statistical analysis, and fast Fourier transforms. The results of these analyses end up in spreadsheets, where you can manipulate them further or export them in tab-delimited ASCII format. There's even a "graphic equalizer" that generates new curve equations as you drag curves around on your charts.

Unfortunately, the high potential of this program is laid to waste by design flaws and bugs. In our testing, we found no fewer than three bugs that were so severe they almost prevented us from continuing our tests; one particularly nasty one trashed our files twice before we figured out what was happening.



FORMULA BUILDER: DeltaGraph manipulates multiple data sets and links to spreadsheets via DDE and OLE—a major benefit for spreadsheet-based data management.

First Looks

The program's many lesser problems (including one bug that prevented us from embedding Stanford charts in other applications), combined with its glacial screen and printing performance, make working with it a frustrating experience.

Many parts of Stanford Graphics are poorly designed. To create a chart, for instance, you must first select the graph type, then mark off the data—you can't do it the other way. You can neither create more than one type of chart from the same spreadsheet, nor change the chart type once the chart is created. Also, it won't let you chart noncontiguous series or exclude unwanted lines. And the 3-D chart rotation was too slow to be usable, even on a 33-MHz 486.

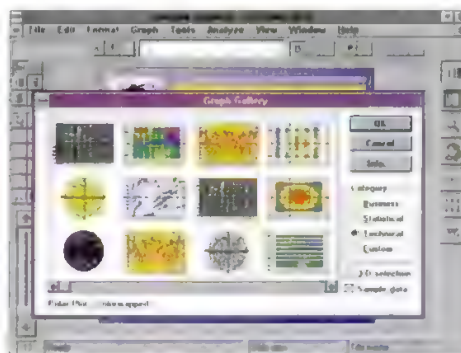
Stanford offers all the trappings of a modern presentation program, including multiple

masters, an outline, a slide sorter, handouts, and speaker's notes. The master system is too complex to set up and does a poor job of enforcing consistency. The masters that come with the package are downright ugly, and there is no setting for a slide aspect ratio, so the shape of your work is at the mercy of your printer driver.

Text-handling and drawing facilities don't fare much better. Text labels don't word-wrap, yet setting the attributes on word-chart objects (which do word-wrap) is convoluted. The program comes with 19 TrueType fonts, but as the names ("Halloween" [sic],

"DearMom," etc.) suggest, they are far too informal and unprofessional to use in any serious presentation.

You can't group, align, or ro-



EXOTIC PLOTS: Stanford Graphics offers more than the garden-variety technical graphs.

tate objects, and the arc tool is an archaic center-radius design that is basically unusable for presentations. Both the manual and the help system are incomplete and frequently inaccurate.

It's unfortunate that a product so valuable in concept should be released in such a rough state. Wait until 3-D Visions works the bugs out before you consider this package.

• **List Price:** *DeltaGraph Professional for Windows, Version 2.0*, \$495. Requires: 4MB RAM, 5MB hard disk space, Microsoft Windows 3.0 or later. DeltaPoint Inc., 2 Harris Court, Suite B-1, Monterey, CA 93940; 800-446-6955, 408-648-4000; fax, 408-648-4025.

Circle 434 on reader service card

• **List Price:** *Stanford Graphics for Windows, Version 2.0*, \$495. Requires: 2MB RAM (4MB recommended), 6MB hard disk space, Microsoft Windows 3.0 or later. 3-D Visions, 2780 Skypark Dr., Torrance, CA 90505; 800-729-4723, 310-325-1339; fax, 310-325-1505.

Circle 435 on reader service card

■ OS/2 Applications

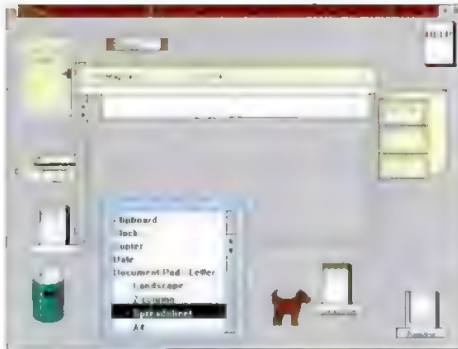
N/Joy: Quirky Application Integration for OS/2

BY JOE SALEMI

The idea of an integrated application that runs under OS/2 2.0 is an appealing one: Why not have a single program that combines text, graphics, spreadsheets, and databases into one document? N/Joy The World Of Objects, \$695 from Vienna Software Publishing, is a 32-bit OS/2 "integrated business solution," but it doesn't always work the way you'd expect it to.

N/Joy extends the OS/2 Workplace Shell's object-oriented features with its own workspace metaphor: an office with individual rooms. The initial room displays icons for a file cabinet, file folders, a trash can, on-line help, a copier, a printer, an exit door, and a catalog of all the objects you can use within documents and rooms.

The primary object in N/Joy



OS/2 INTEGRATION: The object-oriented N/Joy is designed around an office metaphor.

is the integrated document. You can enter text directly, import ASCII files, or transfer text through the clipboard. The word processor is not much more sophisticated than Windows Write and has limits on document size.

To place a spreadsheet in your document, you can use N/Joy's spreadsheet component or import one from Lotus 1-2-3. To add graphics elements, you

either create them as charts from a spreadsheet or import .BMP files.

You can create generic documents and save them as style-sheets for future use. However, since document size is limited, N/Joy is best suited for letters and short reports. Vienna Software recommends that you not exceed about 50 pages.

The internal cardfile object is another central component. Supporting only three different data types—string, number, and date time—this simple database is designed as a super-Rolodex rather than a full database. It's suitable for such tasks as creating mailing lists you can merge with form-letter documents.

OBJECT DISORIENTATION

Object manipulation is where N/Joy's biggest quirks come into play. You can drag-and-drop objects individually or in groups, but the environment uses the right and left mouse buttons in an entirely different

manner than OS/2's Workplace Shell.

In the Workplace Shell, for example, you mark an object for action by clicking on it once with the left mouse button; N/Joy uses the right mouse button. The differences in mouse operation can be very confusing.

On a LAN, N/Joy lets multiple users share documents and rooms and communicate through a built-in e-mail system. Network administrators can establish separate user log-on IDs and passwords to prevent break-ins to rooms and documents.

N/Joy suffers from the same syndrome that has plagued other DOS-based integrated packages over the years: It's fairly easy to use and does many things, but it doesn't do any of them really well.

• **List Price:** *N/Joy The World Of Objects, Version 2.0*, \$695 (\$295 until November 1992). Requires: 6MB RAM (8MB recommended), 10MB hard disk space, OS/2 2.0. Vienna Software Publishing Inc., 1101 S. Rodgers Circle, #14, Boca Raton, FL 33487; 800-392-7724, 407-392-7724; fax, 407-241-5754.

Circle 431 on reader service card.

Now that Data Compression is a must...

It's Your Pick!



Tip:
Choose the data
compression product
that's always ahead of
the competition!

Pick SuperStor™ with UDE™ and anyone can read your compressed data on any PC!

UDE (Universal Data Exchange) is just one of the firsts that gives you the edge with SuperStor. From the beginning, SuperStor has provided the speed, power, and industry leading features that offer you far more than the closest competitor—features like UDE, Automatic Load High, and up to 25% more compression with Recompress.™

And SuperStor 2.0 is consistently chosen number one for ease of use and ease of installation by individuals and companies worldwide.

Just install SuperStor 2.0 and you instantly increase your disk capacity by up to 2-3 times! Then use your computer the way you normally do, no extra commands or keystrokes are required.

Review our list of performance firsts and see who you'd pick to give you the performance you need!

For more information, please call 1-800-732-3133.

AddStor

1040 Marsh Road
Menlo Park, CA 94025 ■ Fax: 415-688-0466

AddStor, SuperStor, Recompress, and UDE are trademarks of AddStor, Inc. Copyright © AddStor, Inc. 1992. All rights reserved. Stacker is a trademark of Star Electronics. All other products are trademarks or registered trademarks of their respective holders.



Performance Standings

Stacker™ SuperStor



FIRST to ship real-time data compression software!



FIRST to offer software performance equal to that of hardware solutions!



FIRST to compress data on floppies, removable hard disks, and Bernoullis®!



FIRST to offer the ability to shrink or expand the size of compressed drives!



FIRST to provide menu-driven installation!



FIRST to be featured in a major disk operating system (DR DOS® 6.0)!



FIRST to recognize whether a diskette is compressed or not (Automount)!



FIRST to offer Recompress, providing up to 25% more compression performance (over ver 1.3)!



FIRST to offer Universal Data Exchange (UDE) that lets anyone read your compressed data on any PC!



FIRST...!

New & Improved

NEWS OF ANNOUNCED PRODUCTS AND UPGRADES

By Emerson Andrew Torgan

IMPROVED

Hewlett-Packard Rolls Out 600-by-600-dpi Ink Jet Plotter

The HP DesignJet 600, **Hewlett-Packard's** high-resolution monochrome ink jet plotter, is the successor to the \$10,995 HP DesignJet. Available in both D-size (24-inch-wide) and E-size (36-inch-wide) models, the unit provides resolution up to 600 by 600 dots per inch and offers a savings of at least \$1,000 compared with the original DesignJet.

The DesignJet 600 provides three output quality levels (300-by-300-dpi addressable draft mode, 300-by-300 final mode, 600-by-600-dpi addressable enhanced mode), 4MB of memory (upgradable to 20MB), and new nesting and queuing features. Six HP JetDirect interface cards provide many connectivity options. The unit switches automatically between HPGL or HPGL/2 (standard graphics languages) and HP RTL (raster transfer language).

• **List Price:** HP DesignJet 600, D size, \$8,495; E size, \$9,995; Hewlett-Packard Co., Direct Marketing Organization, P.O. Box 58059, MS5111-SJ, Santa Clara, CA 95051; 800-752-0900; fax, 208-344-4809.

Circle 403 on reader service card

NEW

PrimeType Provides PostScript Fonts for WordPerfect

LaserTools' PrimeType is an on-the-fly PostScript font package for WordPerfect that includes 20 scalable typefaces and a copy of Adobe Type Manager (ATM) for Windows. According to the company, the \$99 package features proprietary font-caching algorithms that speed printing performance.

The font selection includes four each Times, Helvetica, and Courier typefaces; one each Tekton, Lithos Bold, Franklin Gothic Condensed, and Symbol typefaces; and four additional typefaces. It also gives users access to the 1,500 scalable fonts in the Adobe Type Library. PrimeType supports WordPerfect 5.0 and 5.1, WordPerfect for Windows, LetterPerfect 1.0, and PlanPerfect 5.0 and 5.1.

• **List Price:** PrimeType, \$99. LaserTools Corp., 1250 45th St., #100, Emeryville, CA 94608; 800-767-8004, 510-420-8777; fax, 510-420-1150.

Circle 404 on reader service card

HOT PROSPECT



QuarkXPress for Windows Shakes Up DTP Arena

The impending release of QuarkXPress 3.1 for Windows is guaranteed to shake up the high-end desktop publishing market. The long-awaited program includes many features found in QuarkXPress 3.1 for the Macintosh, including a floating style sheet, a color palette, and a "trapping" palette to improve color separation alignment.

Quark lets users link and unlink columns of text, checking their proper placement with a measurement window that displays the coordinate location of any selected text or graphics frame. It provides control over text wrapping, graphics rotation, leading, and kerning. Users can scale text from 25 percent to 400 percent of the original size, and set type in sizes from 2 to 720 points with remarkable precision (accurate to one-thousandth of a point). Text and images can be freely rotated 360 degrees.

This version of Quark is fully file-compatible with the Macintosh-based version. When users bring a document from one platform to another, all page layout, text, and graphics information is retained, as are any changes made to general, typographic, and tool preferences, according to the company. Complete spell-checking and character search-and-replace functions are available without changing view modes.

• **List Price:** QuarkXPress 3.1 for Windows, \$895. Quark Inc., 1800 Grant St., Denver, CO 80203; 800-788-7835, 303-894-8888.

Circle 401 on reader service card

NEW

Enable Rolls Out LAN-Ready Integrated Software Package

Enable Software's entry-level integrated software package, Enable Works plus, Version 1.0, is ready to run on a standalone PC or on networks running NetWare 286 or 386 or IBM's LAN Server 1.3. The package provides a graphical user interface with pull-down menu access to six modules. The Word Processor provides mail-merge capabilities as well as label design, page preview, and an integrated spell-checker and thesaurus. The Spreadsheet features 3-D capabilities, user-defined page breaks, and customized numeric and currency forms. The Database provides users with "paint-the-screen" input and report forms. The additional modules include Graphics, Communications, and Desktop accessories.

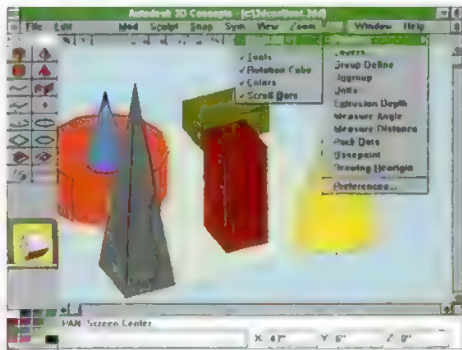
• **List Price:** Enable Works plus, Version 1.0, \$149. Enable Software Inc., 313 Ushers Rd., Northway Ten Executive Park, Ballston Lake, NY 12019; 800-766-7079, 518-877-8600; fax, 518-877-5225.

Circle 409 on reader service card

NEW

3-D Modeling Doesn't Always Have to Be Rocket Science

Autodesk Retail Products is now shipping a three-dimensional conceptual design software package for Windows, but don't be intimi-



3-D Concepts will have you modeling in minutes.

dated by that description. You might just find the product easier to grasp than you think. Autodesk 3D Concepts for Windows, Version 1.0, combines many of the features of the

company's popular DOS-based 3-D CAD package, AutoCAD, with the Windows user-friendly interface.

3D Concepts for Windows lets users change the orientation of an object or set of objects by manipulating the color-coded Rotation cube icon. The visible ground plane feature establishes a 3-D reference frame to identify the top or bottom of a model easily. The align-to-plane function lets users draw and edit objects on a specific plane by clicking on the surface. The package has a choice of shading speeds, offering solid or wire frame construction views of objects depending on the size of a file. 3D Concepts for Windows is compatible with AutoCAD .DXF and Generic CADD file formats, and ships with a set of 275 predrawn 3-D symbols.

• List Price: *Autodesk 3D Concepts for Windows, Version 1.0*, \$249. Autodesk Inc., 11911 North Creek Pkwy. South, Bothell, WA 98011; 800-228-3601, 206-487-2233; fax, 206-483-6969. Circle 402 on reader service card

NEW

Head 'em Up and Move 'em Out With the WinDings Western PIM

Yee-haw! Keep them dogies movin' with **Application Techniques'** WinDings, Version 1.0, the entry-level personal information manager for Windows with a Western theme. The user-friendly package consists of five modules that will drive you down the trail to getting organized.



The O.K. Corral stores important information.

Show Your Cards is an automated card file that holds up to 4,000 contacts and searches by both name and company. World Scout provides a world map with local dates and times and country codes for overseas dialing. Howdy is an auto-dialer that will dial the last contact that was looked up in Show Your Cards. Loan Arranger calculates payments, interest rates, loan durations, or principals. Finally, O.K. Corral offers 11 templates for storing such data as credit card numbers, frequent-flyer miles, or

BRIEFS

Utilities and Add-Ins

Abbot Systems is shipping Calc+ (\$79), Version 1.0, a printing calculator for Windows, and Powerstrip for Windows 3.1 (\$79), a menu bar utility that gives Windows users a Macintosh-style menu bar. It ships with menus for program launching and file compression and decompression. 800-552-9157, 914-747-4171; fax, 914-747-9115.

Alpha Software has unveiled db*Spell (\$99), a DOS-based utility program that lets users spell-check database and spreadsheet files. The program supports Alpha Four, Paradox, dBASE III and IV, FoxPro 2.0 and FoxBase, Lotus 1-2-3, Microsoft Excel 3.0, and any .DBF database or ASCII file. db*Spell Programmer's Edition (\$149) checks for spelling errors in programs written in C, Pascal, BASIC, PAL, and R:Base languages. 617-229-2924; fax, 617-272-4876.

Automation Software Consultants is shipping The Network BASIC Library for NetWare, Version 1.1 (\$265), a collection of over 225 functions for writing utility programs and applications for NetWare. Version 1.1 offers 50 new functions, including the addition of accounting and queue management services, and improved support for file-locking. Also available is The Network C Library for NetWare, Version 2.0, a collection of nearly 400 functions, including the addition of over 40 new functions that provide support for NetWare 386-specific features. 800-669-0842, 513-677-0842; fax, 513-677-3123.

BC Enterprises Software is shipping DB-Dupe, Version 1.1 (\$89), a duplicate record deletion system for dBASE III Plus, dBASE IV, FoxBase+, FoxPro, and compatible databases. DB-Dupe includes DB-Zip, which checks mailing lists for mismatched city, state, and ZIP code combinations. 703-635-9998; fax, 703-635-7528.

BOX Technologies has unveiled WidgetsBuilder, Version 1.0 (\$145), an interactive GUI builder that lets Actor programmers create windows,

information on bank accounts, automobile rentals, hotels and restaurants, and insurance policies. When it's time to exit, click on the swinging doors.

• List Price: *WinDings, Version 1.0*, \$79. Application Techniques Inc., 10 Lomar Park Dr., Pepperell, MA 01463; 800-433-5201, 508-433-5201.

Circle 410 on reader service card

NEW

Video Seven Rolls Out Two Graphics Accelerators

Video Seven, a division of **Headland Technology**, is shipping two reasonably priced products that accelerate graphics performance. WIN.VGA, a Windows accelerator, uses the company's HT216 graphics coprocessor and is available configured with 512K DRAM or 1MB DRAM. The card supports refresh rates of up to 72Hz and 1,024-by-768 resolution with 256 colors in noninterlaced mode, or 1,280-by-1,024 resolution with 16 colors in interlaced mode.

The 1024i Plus, a Super VGA graphics adapter, provides 512K of DRAM and displays 800-by-600 resolution with 256 colors or 1,024-by-768 resolution with 16 colors in interlaced and noninterlaced modes. The 1024i Plus does not offer an on-board coprocessor for Windows acceleration, but it does increase the graphics performance of applications.

• List Price: *WIN.VGA, 512K version*, \$199; *1MB version*, \$249. *1024i Plus*, \$129. Video Seven, a division of Headland Technology, 46221 Landing Pkwy., Fremont, CA 94538; 800-238-0101, 510-623-7857; fax, 510-659-9258.

Circle 405 on reader service card

IMPROVED

WYSIWYG Display and Memory Management Added to Symphony

Lotus Development Corp. is shipping an updated version of its integrated software package with new graphics capabilities, memory management enhancements, and mouse support. Symphony, Release 3, has a WYSIWYG display, spreadsheet publishing capabilities, scroll bars and sizable windows, a spreadsheet auditor, and an improved file viewer.

The WYSIWYG display lets users control fonts, colors, graphics, and text within the package's five modules (Spreadsheet, Word Processing, Graphics, Database, and Communications). Users can also combine formatted text and graphics. The memory management functions let users temporarily disable unused

**SOME FEAR IT.
ALL RESPECT IT.**



WE BUILD IT.

HAMM

HAMMERHEAD

THE PERFECT PRINTING MACHINE.

QMS has just released a serious predator into the sea of ordinary printers. The QMS® 860 Hammerhead™ printer is the first to feed on a Canon® LBP®- BX engine to give you true 600x600 dpi output in up to 11x17/A3 format. Its 25MHz RISC processor and optional EtherTalk®, NetWare®, or a host of other network support make it sleek, fast, and capable. It has everything you've asked for in a desktop printer— high resolution, PostScript® Level 1 and 2 compatibility, HP PCL® and HP-GL® emulation, and up to 11x17/A3. It's fast, compact, compatible with all major platforms, and so affordable that it's causing a frenzy among the competition. The QMS 860 Hammerhead is the perfect printing machine. Get it. Call 1 800 422-2769 ext. 2988 or 205 639-4400 for your nearest QMS dealer.

True 600x600 dpi • 11x17/A3 • \$4595*

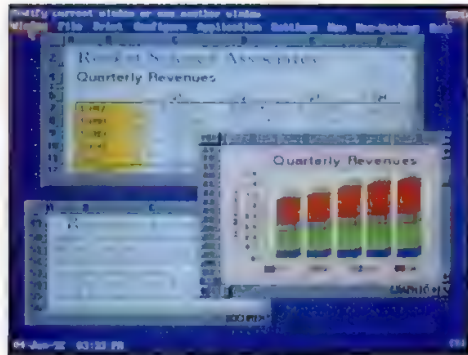


QMS, the QMS logo, and Hammerhead are trademarks or registered trademarks of QMS, Inc. PostScript of Adobe Systems Inc. All other product and company names are trademarks or registered trademarks of their respective companies. * Suggested retail price, US.

CIRCLE 141 ON READER SERVICE CARD

New & Improved

modules, enabling Symphony to access up to 32MB of expanded memory using LIM 4.0, according to the company. The file viewer now imports ASCII text and includes enhanced find, view, retrieve, and link functions.



LOTUS's updated Symphony, Release 3

• **List Price:** *Symphony, Release 3*, \$695. Lotus Development Corp., 55 Cambridge Pkwy., Cambridge, MA 02142; 800-343-5414, 617-577-8500; fax, 617-253-9150.

Circle 406 on reader service card

NEW

Wordlinx 1.0: OCR Software with A Low Price Tag

Ocron has unveiled an OCR (optical character recognition) software package priced at a low \$145. Wordlinx, Version 1.0, operates as a menu item in Windows word processors and applications such as Word for Windows, Microsoft Excel, and Ami Pro. OCR functions are performed through a single menu in an open file, letting users scan a document and insert the recognized text without exiting the application.

Wordlinx can recognize and transfer features such as columns, tabs, and paragraphs, as well as text attributes such as underlining, bold-face, italics, kerning, ligature, and font size. It includes a text verifier, full omnifont capability, and can recognize 11 European languages. It is compatible with most flatbed and hand-held scanners.

• **List Price:** *Wordlinx, Version 1.0*, \$145. Ocron Inc., 3350 Scott Blvd., Bldg. 36, Santa Clara, CA 95054; 800-933-1399, 408-980-8900; fax, 408-980-5100.

Circle 411 on reader service card

NEW

CAM Unveils PARISS Line of Business Management Apps

Computer Aided Management's new product, PARISS Enterprise, Version 1.0, is the

BRIEFS

Utilities and Add-Ins

dialog boxes, and controls. The program also automatically generates Window Description Language (WDL) statements. 514-485-6690, fax, 514-485-2095.

Bullseye Systems' File Linker (\$295) is a conversion utility for importing and exporting files, records, and fields from one application to another. Users enter the type of source and destination file, and the program imports the source file one record at a time. Once source and destination fields are matched by the user, the program will transfer the remainder of the records. 408-266-9226.

Extrasensory Software is shipping upgraded versions of its three Clipper development libraries: Telepathy, Version 1.5 (\$219.95), a serial communications library; FAXual.lib (\$99.95), Version 1.5, a library of fax functions; and the PostScript Library for Clipper, Version 1.5 (\$149.95), which provides an interface between a developer's Clipper applications and PostScript printers. 818-981-8367; fax, 818-986-5411.

Intex Solutions has unveiled three new additions to its line of spreadsheet add-in products for use with Lotus 1-2-3.

Ready to Run Accounting, Version 2.12 (\$199.95), is Intex's small-business accounting package. It runs as a spreadsheet add-in, providing General Ledger, Payable/Receivable, Billing, Inventory, Order Entry, and Payroll modules. The update supports Lotus 1-2-3, Releases 2.3, 2.4, 3.1, and 3.1 Plus. The program offers enhanced laser-printer support and check-writing features.

Spellin! for Release 3 (\$95) is a spell-checking utility for Lotus 1-2-3, Releases 3.1 and 3.1 Plus. The program will spell-check a complete spreadsheet or a highlighted range. Spellin! for Release 3 has a 90,000 word dictionary and provides a list of alternative words when it encounters a misspelling.

first in a line of network-ready project management applications. PARISS (Project, Accounting & Resource Information Support System) Enterprise replaces the project management application, ViewPoint, Version 4.1.

The program provides users with automated structured planning, resource calendars, table editors, presentation graphics, and management reports. The Subprojects feature summarizes pieces of work within the project, illustrating how small changes will affect the deadline. The Interface events feature allows the user to see where one job affects another by showing the sequence of events from job to job. PARISS offers resource management capabilities such as resource leveling, constraining, balancing, and load tracing.

• **List Price:** *PARISS Enterprise, Version 1.0*, \$2,750; upgrade from ViewPoint 4.1, \$500. Computer Aided Management Inc., 1318 Redwood Way, #210, Petaluma, CA 94954; 800-635-5621, 707-795-4100; fax, 707-795-0441.

Circle 407 on reader service card

NEW

GammaFax MLCP-4/AEB: It's Not Just Another Fax Card

GammaLink, maker of network-ready fax boards such as the GammaFax CP and the GammaFax XPress, has unveiled the GammaFax MLCP-4/AEB, a single programmable board providing four fax ports supporting up to 24 channels. The MLCP-4 is designed to accommodate such new technologies as interactive voice/fax response, imaging systems, and high-volume switch systems.

The unit connects to a telephone network through an Analog Expansion Bus (AEB) via an AEB-compatible board, offering the potential for developing systems incorporating voice, T1, and voice-recognition technology. It features four 16-MHz 80188 processors, 2MB of RAM, 128K of ROM, and four Rockwell R96DFX modems.

• **List Price:** *GammaFax MLCP-4/AEB*, \$3,995. GammaLink, 1314 Chesapeake Terrace, Sunnyvale, CA 94089; 408-744-1400; fax, 408-744-1900.

Circle 408 on reader service card

NEW

Software That Answers the Question: What's My Line?

For managers who can't seem to explain a position to a potential job candidate or are frustrated when trying to define an employee's responsibilities, **KnowledgePoint** has the

WAY MORE POWER...



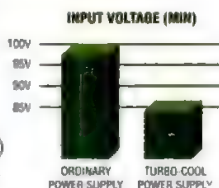
...IT'S JUST ONE OF 10 GREAT REASONS TO SELECT TURBO-COOL™ POWER SUPPLIES.

1. 50% TO 100% MORE POWER

The more power, the better! Our high-capacity units start drive motors with ease, run cooler, last longer, and allow for future expansion.

2. BUILT-IN LINE CONDITIONING

Turbo-Cool power supplies won't skip a beat when the line voltage sags. Their wide input range (85-135V, 170-270V) and heavy-duty input components protect your PC and its data from sags, surges and spikes.



3. FCC-B AND VDE-B LINE FILTER

A dual-stage EMI filter keeps electrical noise well below agency standards.

4. INDEPENDENT REGULATION

Turbo-Cool's superior independent-regulation design keeps output voltage tolerances 20 times tighter than that of an ordinary

power supply. This exceptional stability improves hard drive reliability during critical access periods.

5. ULTRA-CLEAN DC OUTPUT

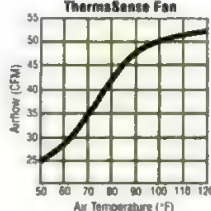
A dual-stage output filter ensures that sensitive computer chips receive pure, low-ripple power.

6. PROTECTION CIRCUITRY

Our units offer the most complete protection from dangerous overvoltage, overcurrent, and short circuit conditions.

7. THERMASENSE™ COOLING FAN

The Turbo-Cool 300 features ThermaSense, our high-capacity, thermostatically-controlled, variable-speed fan.



The cooling is ideal! High-performance systems operate up to 35° cooler while standard ones run as much as 75% quieter.

8. UL/CSA/TUV APPROVALS

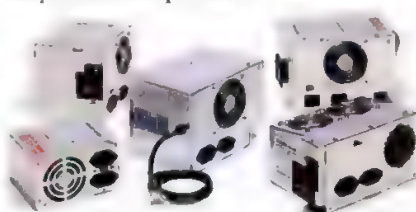
Our high-capacity units are safety approved by not only UL, but also by Canada's CSA and Germany's strict TUV.

9. TWO-YEAR WARRANTY

Turbo-Cools are designed and tested for MTBFs of over 100,000 hours. They come with a no-hassle 2-year warranty and a 30-day money-back guarantee.

10. GREAT VALUE

Loaded with premium features, a Turbo-Cool power supply will upgrade the performance of your PC or LAN file server at a retail cost of only 55¢ to 80¢ per watt.



PG POWER & COOLING, INC.

"THE LEADER OF THE PACK"

5995 Avenida Encinas, Carlsbad, CA 92008 • (619) 931-5700 • (800) 722-6555 • Fax (619) 931-6988

answer. **DescriptionsWrite Now!**, Version 1.0, is designed to help users write custom job descriptions via a question-and-answer process that defines supervisory responsibilities, qualifications, physical demands, and the work environment.

DescriptionsWrite Now! offers some unique features, including context-sensitive human resources advice on writing job descriptions, a job library with more than 2,400 job titles, and the ability to merge job duties from an unlimited number of descriptions into one.

• **List Price:** *DescriptionsWrite Now!*, Version 1.0, \$149. **KnowledgePoint**, 1311 Clegg St., Petaluma, CA 94954; 800-727-1133, 707-762-0333; fax, 707-762-0802.

Circle 412 on reader service card

IMPROVED

QuickMail Supports PCs and Macs In PC LAN Environment

CE Software's QuickMail currently supports both Macintoshes and PCs on AppleTalk networks. Quickmail, Version 2.5, now supports both platforms in PC LAN environments that support AFP-compatible file services such as NetWare, LAN Manager, and VINES.

The package now has two PC clients: QuickMail for DOS with AppleTalk and QuickMail for DOS with File Servers. The former is for PCs on an AppleTalk network; the latter supports PCs on PC LANs that connect to Macintosh systems via AFP-compatible file services and require no additional hardware or software to access all QuickMail gateways and bridges on the QuickMail server. The package requires a dedicated Macintosh server and is compatible with Windows through a DOS compatibility box.

• **List Price:** *QuickMail*, Version 2.5, 5 users, \$399; 100 users, \$4,699. **CE Software Inc.**, 1801 Industrial Circle, P.O. Box 65580, West Des Moines, IA 50265; 800-523-7638, 515-244-1995; fax, 515-244-4534.

Circle 416 on reader service card

IMPROVED

WordStar for Windows Update Supports Windows 3.1

WordStar International's WordStar for Windows, Version 1.5, now takes advantage of many of the new features in Windows 3.1 including TrueType fonts, common dialog boxes, and drag-and-drop text handling. The new release, which is priced at \$119 (at least through the end of 1992), also offers an increase in speed, according to the company.

BRIEFS

Utilities and Add-Ins

UltraBar (\$69.95) for Lotus 1-2-3, Release 3.1, provides users with up to 75 icons, arranged in palettes, that activate any 1-2-3 command, macro, or add-in application. The program includes 45 predefined icons and lets users create custom icons. 617-449-6222.

PC Publishing's Success for DOS, Version 1.0 (\$159.95), takes data and graphics from Lotus 1-2-3 worksheets and lets users create presentations including slides, overhead transparencies, and speakers' notes. Success requires Lotus 1-2-3 2.x, and PC Publishing's popular add-in, Impress 2 or 2.L or WYSIWYG (including Release 2.4). 800-634-4555, 617-661-8050; fax, 617-661-7811.

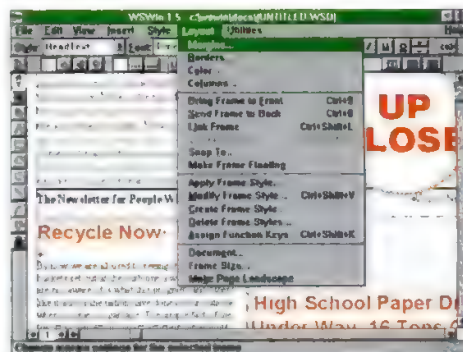
SCSI

Always Technology is shipping the AL-4000 (\$199), a high-speed SCSI adapter designed to connect SCSI devices to the parallel port of a PC. The AL-4000 system includes the adapter, cables, and advanced SCSI programming interface (ASPI) software drivers and utilities for hard disk drives, and for a variety of fixed and removable media such as optical disk drives, CD-ROM drives, and tape drives. 818-597-1400; fax, 818-597-1496.

Distributed Processing Technology is shipping the cache-convertible SCSI adapter SmartCache Plus, available in both 32-bit EISA (\$785) and 16-bit ISA (\$595) models. The units ship with a collection of software drivers that include support for DOS, NetWare, OS/2, and Unix. 407-830-5522; fax, 407-260-5366.

Paralan's Parallel-SD10, an external SCSI differential converter (\$475), lets users connect differential SCSI devices to single-ended SCSI systems or connect single-ended SCSI devices to differential SCSI systems. The Parallel-SD11 (\$285) is an internal version of the unit. 619-560-7266, fax, 619-560-8929.

WordStar for Windows now features OLE (Object Linking and Embedding) Client support, allowing users to establish links and insert graphics, text, or numbers from other Windows applications. Table creation is improved by implementing a table tool for frames that users drag to the proper size. A new on-line tutorial, two new graphics filters (.GIF and .PIC), and the addition of Correct Grammar for Windows, Version 2.0, round out the enhancements. Registered users of WordStar for Windows, Version 1.0, can get the update for \$29.95 by calling 800-426-8855.



The \$29.95 WordStar for Windows upgrade.

• **List Price:** *WordStar for Windows*, Version 1.5, \$495 (\$119 through the end of 1992). **WordStar International Inc.**, 201 Alameda Del Prado, P.O. Box 6113, Novato CA 94949; 800-227-5609, 415-382-8000; fax 415-883-1629.

Circle 414 on reader service card

IMPROVED

filePro Plus Gains a Host of New Features and Enhancements

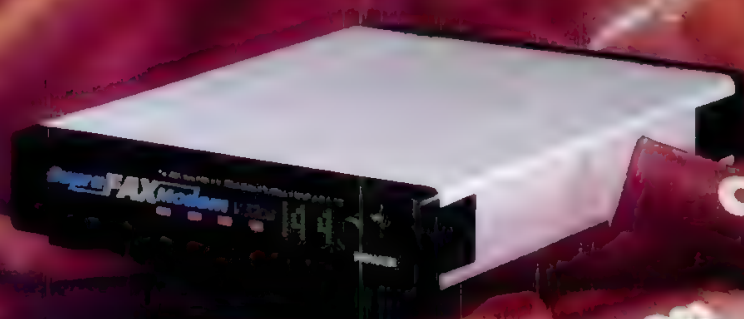
The Small Computer Co. has unveiled an update to its database package that features new screen prompts when creating lookups, a faster fuzzy search capability, 4 new commands, and 11 new processing functions, according to the vendor. When displaying a group of selected records in a browse window, filePro Plus, Version 4.1, now lets users show the group starting at the first or last record, in either ascending or descending order. Processing labels can be defined within a lookup, and a drop command prevents selected records from appearing in a browse window. New screen prompts available when creating a lookup within the define lookup screen include "show," "order of records," "position of first record," and "processing label."

• **List Price:** *filePro Plus*, Version 4.1, \$699. **The Small Computer Co. Inc.**, 41 Saw Mill River Rd., Hawthorne, NY 10532; 800-847-4740, 914-769-3160; fax, 914-769-3653.

Circle 415 on reader service card

**NOW
SHIPPING**

Dynamite Comes in a Small Package...



Voice*

Caller ID*

14,400 bps FAX

\$399⁹⁵

14,400 bps DATA

5 Year Warranty

Never before has so much power & technology been packed into a SupraFAXModem! The SupraFAXModem V.32bis combines a potent mix of fax and data features — for explosive results! Maximum fax potential is achieved with Group 3 fax machine compatibility at up to 14,400 bps and Class 1 & 2 software compatibility. With raw data speeds from 300 to 14,400 bps, and up to 37,600 bps with V.42bis compression,

it biases data over telephone lines. Plus its revolutionary display gives you 25 different status reports!

For just a little more, you can add caller ID and voice capabilities later this year. All this for the dynamite price of \$399.95! In addition to the stand-alone version (without software) SupraFAXModems are available in Windows™, DOS™, and Macintosh™ packages.

SUPRA FAK MODEM



Supra Corporation

9600 bps Version
\$299⁹⁵

1-800-727-8417



* Low-cost, user-installable Voice & Caller ID upgrades available Q3 '92 • Distributed by Merisal, Ingram Micro, and Beamscope • All trademarks belong to their respective companies.
7101 Supra Drive SW, Albany, OR 97321 USA • Dealer Sales: 503-967-2480 • Fax: 503-967-2401 • 503-967-2410

CIRCLE 191 ON READER SERVICE CARD

THE MOST POWER



FULL 486SX. GOING.

Behold the new Toshiba T4400SX notebook—the first 486SX computer to offer all the power and performance of a desktop computer while freeing you from the tyranny of the nearest electrical outlet.

For starters, the T4400SX offers a 25 MHz 486SX microprocessor with



You can use our credit card-sized memory modules to expand standard 2MB RAM to 18MB for added speed and multi-tasking capabilities.

8K internal cache, upgradable to a full 486DX. Plus an 80 or 120 MB hard drive and standard 2 MB RAM, expandable to 18 MB.

The T4400SX is the only notebook computer that offers a high-speed Gas Plasma screen, which means no mouse blur. And its 100:1 contrast ratio delivers seven times the contrast of a typical LCD display.

Or if you prefer, you can choose our 9.5" diagonal LCD display, the most state-of-the-art LCD available, with uncompromising clarity from the black and white ultra thin screen.

Both offer a 640x480 VGA high-resolution display as well as the graphic versatility of 16 gray scales for the gas plasma screen and 64 gray scales for the LCD screen.

For familiarity and ease of use, the T4400SX has a full-function keyboard with standard size keys and key spacing.

The Nickel Cadmium battery provides more than 3.5 hours of computing power. Our AutoResume feature allows you to shut down and start up precisely where you left off.

And for added expandability and connectivity, there are built-in parallel, serial, video, keypad/board, mouse and bus expansion ports. There's even



If you choose the 9.5" diagonal LCD display, you get the versatility of 64 gray scales as well as high-resolution 640x480 VGA on the black and white ultra thin screen.

a dedicated modem slot for an optional internal cellular-ready, 9600 bps fax or standard modem.

All that in an ultra-strong 11.7" Wx 8.3" Dx 2.2" H carbon fiber-reinforced case weighing only 7.25 lbs that fits into half a briefcase.

If you'd like to know more about the T4400SX notebook computer, or any

On those occasions when you're actually at your desk, you can plug your T4400SX into our optional Desk-Station IV with all standard desktop hardware connections and expandability.



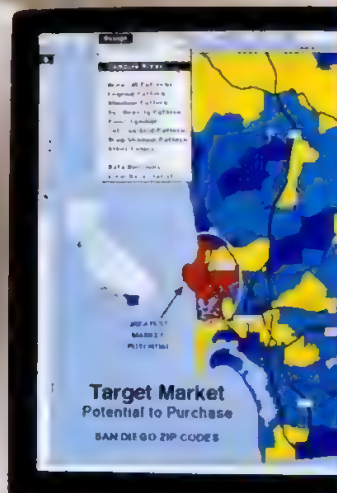
of our full line of Toshiba portables, call us at 1-800-457-7777.

We'll send you information that can lead to only one conclusion about desktop computers:

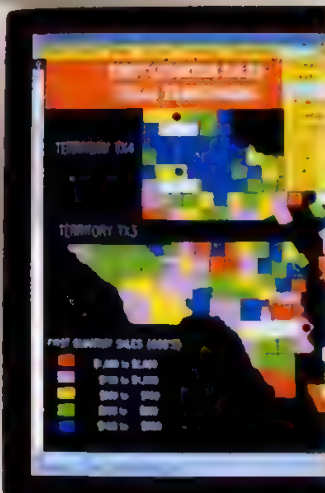
Going. Going. Gone.

In Touch with Tomorrow
TOSHIBA

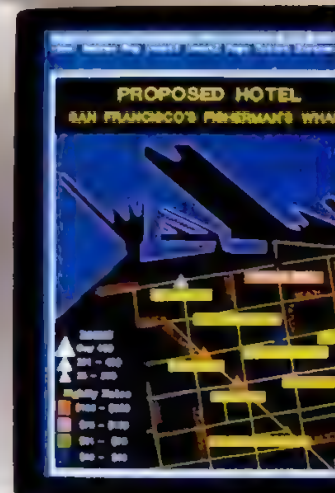
A MAP FOR ALL REASONS...



MACINTOSH



MS WINDOWS



MS DOS

Most business people still use maps for things like planning vacations and teaching geography to the kids. At Strategic Mapping™ we're helping people use maps to enhance their business decisions. By linking maps to a database or spreadsheet on a PC or



Macintosh, we've taken the concept of an atlas into the 21st century. Now, over 25,000 companies — including many of the Fortune 500 — are using our Atlas Software to help make critical business decisions for a multitude of reasons.

Target Marketing — Companies like General Foods, Prudential Insurance and

American Express leverage their sales and marketing dollars with Atlas Software by focusing on the right customers — in all the right locations.

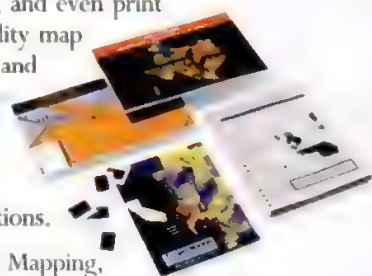
Sales Territory Management — Sony, 3M and Eastman Kodak maximize profits by using Atlas Software to manage their sales territories more effectively.

Site Selection — Citibank, Arby's and Pizza Hut take the guesswork out of selecting new business locations by using Atlas Software.

Distribution Planning — Federal Express, Miller Brewing and Coca-Cola radically improved productivity and efficiency with Atlas Software — making certain that deliveries are on time, and on budget.

Research shows that 85% of business databases contain critical location based information, yet most businesses fail to view and analyze their information

geographically. With Atlas Software, you can better understand your database, and even print high quality map graphics and reports adding sizzle to your presentations.



Strategic Mapping, Inc. provides the combination of power, ease of use and affordability that has made us the market leader since 1984.

Call us today for a free *Strategic Mapping Guidebook* and demo disk. You'll see why we were rated #1 by *PC Week* — and why *MacUser* gave us their 5 mice rating.

CALL: (408) 970-9600
FAX: (408) 970-9999

Strategic Mapping, Inc.
3135 Kifer Road
Santa Clara, CA 95051



In Canada, call 416 693-4166
In the UK, call 44-81-994-2780

In Germany, call 49-228-62-73-82
In Australia, call 61-3-866 1766

In Belgium/LUX, call 32-2-771-25-75
In the Netherlands, call 31 340 266 336

In France, call 33-1-45-27-20 61
In Denmark, call 45-42-25-17-77

CIRCLE 221 ON READER SERVICE CARD

Read Only

REVIEWS OF THE LATEST BOOKS FOR THE PC USER

Edited by Carol Levin

Visual Basic Guide Gets Down to Business with Solutions that Work

BY BARRY SIMON

Developing Windows programs was just plain hard before the arrival of visual development environments, which shield programmers from much of the underlying complication of Windows. If you've ever programmed in Visual Basic or are thinking seriously about doing so, get The Waite Group's *Visual Basic How-To*. Its question-and-answer framework is ideal for languages, and the collective depth of knowledge of authors Robert Arnson, Daniel Rosen, Mitchell Waite, and Jonathan Zuck make it more than just another good programming book.

Subtitled "The Definitive

Visual Basic Problem-Solver," *VB How-To* covers over 70 problems and solutions that use Visual Basic and calls to the Windows API (Application Programming Interface). Special attention is paid to menus, graphics, and the mouse. You'll learn how to trap both single- and double-click events, pop up a menu of font samples, create a phone dialer, and build mini-projects as diverse as a gauge control, a pie chart, a slide-show module, and a screen-capture program. A few of the topics cover aspects of Visual Basic that are not well documented: using control arrays to add new controls at run time, producing a Windows 3.0-style directory

choice box with directories and drives in a single list, and using the Key Pressed event to force a text box to accept only numeric input.

VB How-To comes with several third-party demo controls on-disk so you can extend the toolbar with functions such as playing MIDI music and monitoring system resources. The book's final chapter shows you how to write DLLs (dynamic link libraries) in C and call them from Visual Basic. All forms, fonts, bitmaps, DLLs, and controls are included on-disk.

The "how-to" framework shines also as an introduction to the Windows API. The API is difficult to get into since Microsoft's official SDK (Software Development Kit) documentation does not include much tutorial help, but there are times

when you must turn to the API for services that Visual Basic doesn't offer. Among the techniques you'll learn are: determining if an instance of your program is already running, clearing a list box more quickly than you could using line-by-line Visual Basic calls, masking input in a text box for password entry, and arranging icons on the desktop.

To top it off, the prose is crisp and clear and the code readable. Serious Visual Basic programmers can't afford to be without this superb book.

• *Visual Basic How-To*, by Robert Arnson, Daniel Rosen, Mitchell Waite, and Jonathan Zuck, \$34.95, Waite Group Press, 200 Tamal Plaza, Corte Madera, CA 94925; 800-368-9369, 415-924-2575. ISBN: 1-878739-09-3.

Circle 482 on reader service card



One-Stop Advisor to Building and Managing the NetWare Environment

BY JEFFREY HSU

Network managers are shouldering more and more responsibility as the number of choices in the market increases and the need to plan for expansion grows. In *Building Local Area Networks*, authors Patrick Corrigan and Aisling Guy examine all the issues you'll need to consider when designing a LAN and offer advice that can help save you money and hours of troubleshooting.

Corrigan and Guy start with a primer on LAN anatomy,

then jump quickly to technical aspects of network protocols, topologies, and cabling. The overview wraps up with a look at LAN connection hardware, architectures, and factors to consider in designing a client-server environment, with plentiful diagrams along the way.

After that, it's NetWare all the way. There are guidelines for choosing between 2.x and 3.x, selecting LAN hardware (network interface cards,

file servers, and disk drives), and planning for expansion. A brief chapter on LAN applications reviews messaging protocols and fax gateways, and the chapters on installation provide hands-on details and specific commands.

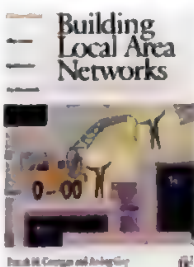
The second half of the book begins with a chapter on building the NetWare environment—planning the directory structure, granting directory rights, and using SYSCON, the system configuration tool. Later chapters delve into network printing, the file-server console's monitoring functions, data backup, and power protection. Extras include sections on trouble-

shooting and upgrading, a NetWare command summary, a listing of third-party products, and a disk of utilities (\$15).

Trying to cover everything, though, does have its drawbacks. Many of the explanations are very short, and the instructions tend to be overly brief and technical for beginners. For users who have a foundation of LAN knowledge, *Building LANs* serves quite well as a reliable companion as you design, install, and manage your NetWare environment.

• *Building Local Area Networks*, by Patrick H. Corrigan and Aisling Guy, \$29.95, M&T Books, 411 Borel Ave., San Mateo, CA 94402-3522; 800-688-3987. ISBN: 1-55851-237-3.

Circle 483 on reader service card

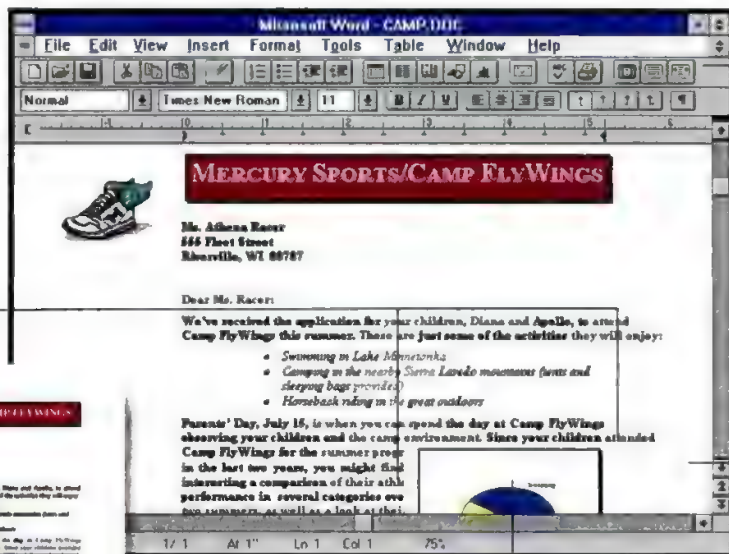


Their Word.

Microsoft Word 2.0

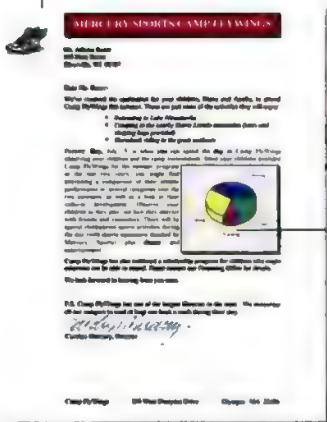
1

Don't take their word for it. Compare what you see on screen with what you get when you print. Notice, on screen, how some words are cut off and how the text runs beyond the margins. Now is that what you call WYSIWYG?



3

What good are tools if they're inflexible? The Toolbar™ in Word sits on the top of your screen—on or off—those are your only options. And though you can change icons, you can't save sets of the ones you use most. And you certainly can't create your own icons.



2

Want to circle a word in text or annotate your charts and graphs for added emphasis? Don't even try it in Word—because you can't.

4

Word has a Drag-and-Drop text editing feature. But that's about as far as it goes.

Against Ours.

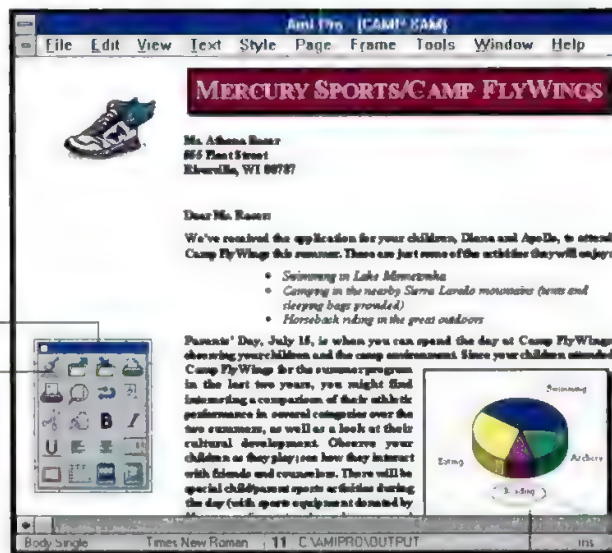
Lotus Ami Pro 3.0

3

Only Ami Pro 3.0 gives you colorful SmartIcons for one-click access to your most frequent tasks. And the freedom to customize, arrange or place them anywhere you choose. You can even create your own personal sets of SmartIcons based on the tools you need for certain tasks.

4

Of course, Ami Pro 3.0 has Drag-and-Drop, too. But that's not all. Ami Pro 3.0 is the only word processor with Fast Format. So you can take the formatted attributes of a highlighted block of text and, with one quick click, apply those attributes to other text blocks.

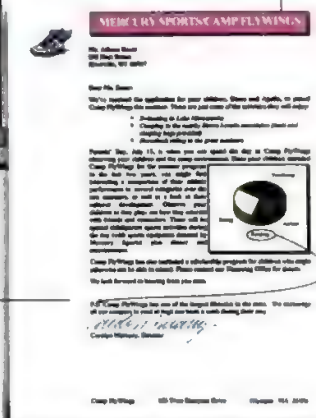


2

Use Ami Pro 3.0's frames and drawing tools to quickly and easily annotate charts, graphics or your whole page with lines, arrows and circles. Try it with Word and you'll end up going round in circles.

1

Ami Pro 3.0 gives you WYSIWYG in its truest form. What-You-See-Is-What-You-Always-Get, no matter what fonts or view you're working with, including Full Page view. All your text is there on screen, right where you put it. Now isn't that what WYSIWYG was meant to be?



There's no question about it. The new Lotus Ami Pro™ 3.0, the only word processor designed exclusively for Windows™, is not only technically superior to Microsoft® Word. It's also much easier to learn and use.

Now if this comes as a surprise to you, or if you haven't yet considered Ami Pro, then you need to try it for yourself. Because once you do, you'll understand why *PC Computing* (8/92) wrote that "Ami Pro 3.0 answers all the formidable challenges that Word for Windows 2.0

laid down and presents some new challenges for Microsoft to wrestle with."

Ami Pro 3.0 includes all the unique capabilities you see above. As well as a host of other easy-to-use features such as: a Style Sheet Viewer that lets you preview Style Sheets before selecting; SmartMerge™ that literally walks you through the different steps of completing a mail merge; a Clean Screen feature that lets you view only the tools you want to see on-screen to maximize workspace; a unique

Context-sensitive Help system that's attached to each dialog box; and a QuickStart tutorial that gets you going in no time.

So don't take their word for it. Or even ours. You be the judge. If you're comparing word processors, order your free working model of Ami Pro 3.0 today by calling 1-800-872-3387, ext. 6960. Or better still, upgrade from your current word processor* for just \$129 and enjoy our new, free 24 hour support along with a 60-day money back guarantee.

Lotus Ami Pro 3.0 Word Processor for Windows

are trademarks of Microsoft Corporation. Adobe Type Manager and the ATM logo are registered trademarks, in the United States, of Adobe Systems, Inc. *Offer expires March 31, 1993. Call for a list of eligible word processors. (Note: Microsoft Word screen was created with Microsoft Word 2.0a using Windows 3.1. Ami Pro screen was created with Ami Pro 3.0 using Windows 3.1. Both were created using TrueType fonts at 75% view level.)

SmartSuite The best solution in Win

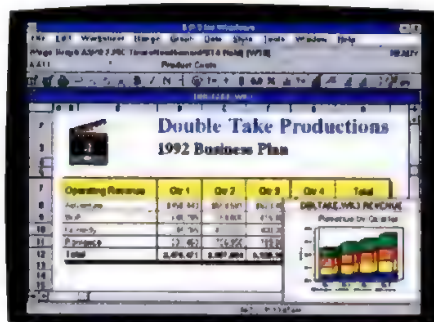
If you're looking for a better way to work in Windows,[™] SmartSuite[™] from Lotus[®] is one smart choice. Because not only does this suite of four award-winning Windows products offer you an incredible value for your money. It also delivers individually outstanding products that work together. Each shares a common interface. As well as common features like our unique SmartIcons[™] for one-click access to the tasks you perform most frequently. Which means the products work so much alike that when you learn one you've learned them all.

**It's pure Windows.
Pure 1-2-3.**



Take
1-2-3[®] for
Windows,
for example.

It brings you all the power of The World's Most Popular Spreadsheet[™], including 3-D worksheets, automatic print compression and our unique Solver technology. And it now includes file compatibility with Microsoft[®] Excel, support for Windows 3.1 and overall improvements in its performance and speed. It even gives DOS users access to the 1-2-3 for DOS Classic[®] menu at the mere push of the slash key.



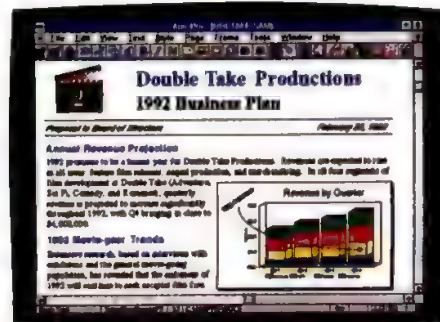
"Lotus 1-2-3 for Windows is completely Windows and completely 1-2-3."
—Windows Magazine, 11/91



Ami Pro.

Words alone can't describe it.

With Ami Pro[™], you'll find a feature-rich, easy-to-use word processor that comes with dozens of pre-formatted Style Sheets. Which means you can get professionally designed



"Ami Pro stands unchallenged as the most powerful and enjoyable Windows word processor."
—PC Magazine, 11/21/91



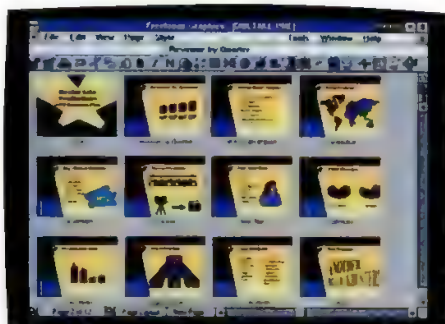
**Freelance Graphics. Your partner
for successful presentations.**

Freelance Graphics[™] gives you the fastest, easiest way to create a great-looking presentation. Its unique SmartMasters[™]

*In Canada, call 1-800-80-LOTUS. ©1992 Lotus Development Corporation. All rights reserved. Lotus and 1-2-3 are registered trademarks and SmartSuite, Freelance Graphics, SmartIcons, SmartMasters and The World's Most Popular Spreadsheet are trademarks of Lotus licensed to Lotus Development Corporation. Microsoft is a registered trademark and Windows is a trademark of Microsoft Corporation. Personal Training Systems is a registered trademark of Personal Training Systems, Inc.

from Lotus. on for working dows.

automatically manage the design and layout of your presentation for you. Simply select the design you like, follow the on-screen prompts and fill in the blanks with text and graphics. It's that simple. And if you've never used a presentation program before, QuickStart, its on-line tutorial, will get you up and running in minutes.

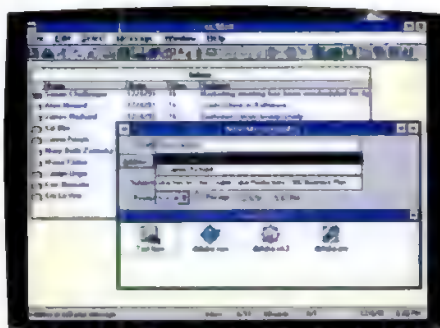


"No other presentation package lets you go from initial idea to final product with greater ease."
—PC Computing, 11/91

cc:Mail. The leader in electronic mail.



And cc:Mail®? It's the most popular electronic mail package in the world. Take a quick look at what it delivers and you'll know why.



"Sending a cc:Mail message is easier than addressing an envelope and licking a stamp."
—PC World, 9/91

It lets you send text, files, graphics and facsimile items across all major platforms, like DOS, Windows, OS/2® and Macintosh®. It runs smoothly on any server or network operating system in any configuration. And its unique architecture makes it easily scalable to fit the size of your workgroup, whether it's five or 500,000.

More good news? SmartSuite costs less than the price you'd expect to pay for two of these products. And it even includes a free Windows 3.1 tutorial from

Personal Training Systems®, complete with an audio cassette, manual and demo disk.

So if you still think that buying a suite of products from one company means sacrificing product excellence for price, we have two suggestions. Step back and consider what's in SmartSuite. Then

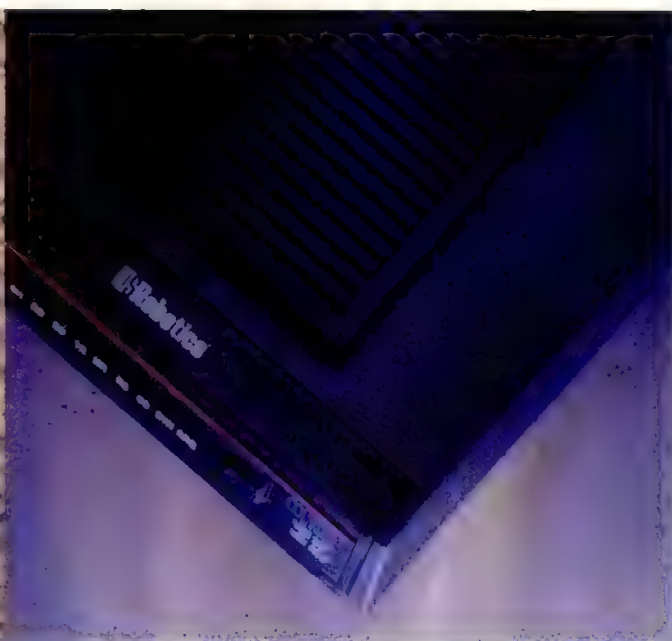
consider what's behind it...the most comprehensive service and support in the industry.

So do the smart thing. Call **1-800-872-3387, ext. 6853**, for more information and a free auto demo disk. Or simply visit your Lotus Authorized Reseller.

Lotus SmartSuite for Windows

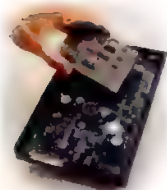
1-2-3, Ami Pro, Freelance Graphics, and cc:Mail

Development Corporation. Ami Pro is a trademark of Samna Corporation, a wholly owned subsidiary of Lotus Development Corporation. cc:Mail is a trademark of cc:Mail, Inc., a wholly owned subsidiary of Lotus Development Corporation. Classic is a registered trademark of Personal Training Systems, Inc. OS/2 is a registered trademark of International Business Machines Corporation. Macintosh is a registered trademark of Apple Computer, Inc.



They're both fast and powerful, but only one will never be obsolete.

**INTRODUCING THE UPGRADABLE COURIER
MODEM FROM U.S. ROBOTICS.** The Courier that
you buy today can transmit data at 14,400 bits
per second. Tomorrow, it's field upgradable to
transmit at the newly proposed 28,800 bps
standard and achieve throughput of up to
115,200 bps. Our modular architecture makes
for an incredibly simple upgrade.



And nothing could be more eco-

*The Courier Modem is easily field upgradable.
It's a do-it-yourself upgrade with no downside.
Simple, convenient and economical.*

nomical, because U.S. Robotics
doesn't build in the cost of upgrades
you may never want. A Courier Modem is
only \$895. The upgrade is just \$299* if and
when you need it. Courier doesn't cost you

more, it just offers you more.

You not only get the comfort
of knowing your modem will
never be obsolete, you also get
the peace of mind that comes
with every U.S. Robotics prod-
uct. Superior quality. Outstanding service. And
the industry's acknowledgement of perfect per-
formance, including a #1 rating in PC/Compu-
ting's 200 Best PC Products for 1992.



*Courier was named the
#1 high speed modem
in PC/Computing's
200 Best
PC Products for 1992.*

Make the Courier modem the last modem
that you will ever buy. For more information,
call toll free, (800) DIAL-USR. In Canada,
(800) 553-3560.

**Upgrade available when
CCITT Standard is complete.*

THE INTELLIGENT CHOICE IN
DATA COMMUNICATIONS

U.S. Robotics

CIRCLE 231 ON READER SERVICE CARD

Toolkits

REVIEWS OF THE LATEST TOOLS FOR THE PC PROGRAMMER

Edited by Trudy Neubaus

KEDIT 5.0: A Fast and Flexible Text Editor

BY SAL RICCIARDI

Mansfield Software Group's KEDIT has a reputation as a fast, capable text editor for PCs running DOS or character-mode OS/2. Its latest release, Version 5.0, won't disappoint you; it adds mouse support, full Undo/Redo capabilities, hyper-text help, a macro debugger, and a host of other enhancements.

KEDIT makes it easy to create and edit ASCII files such as source code, e-mail messages, and unformatted documents. It is extremely fast, partly because it loads your entire file into memory at once instead of paging portions to and from disk. Of course this means it can't handle files that are larger than the available RAM, EMS (expanded memory), or XMS (extended memory). But unless you're editing a very large file on a DOS machine with very little memory, this won't be a

problem. On a 640K DOS system with no EMS, over 300K is available for editing; the OS/2 version can address up to 16MB of virtual memory.

You can have up to 20 files in memory at once and can split the screen into eight windows to edit multiple files simultaneously. KEDIT's windows are tiled and not as flexible as the overlapping windows found in some other products. But you can edit the same file in more than one window, in which case the changes you make in one window are reflected in the others automatically. Moving or copying text between files is easy, since KEDIT's rich, complete command set supports a variety of block types (for example, line, box, and stream) and unusual block operations (like overlaying and shifting).

The product is extremely easy to reconfigure. You can customize the screen layout and change all of the default key as-

signments. In addition to assigning KEDIT commands to keys, you can write macros using a built-in subset of the REXX language called KEXX. KEXX is well suited to text manipulation and easy to learn. KEDIT also supports an interface to Quercus Systems' Personal REXX (a full implementation of REXX for DOS and OS/2), as well as IBM's OS/2 REXX.

KEDIT is highly compatible with XEDIT, an editor used in many IBM mainframe shops. One feature KEDIT borrows from XEDIT is the ALL command, which implements selective line editing. This lets you exclude lines from display and see only those that match your target, such as all lines containing a certain variable name. You can then edit the subset as though the other lines did not exist.

As I mentioned earlier, Mansfield Software has added mouse support with this release as well as an optional, reconfigurable mouse bar located at the bottom of the display. The mouse bar contains default buttons for common functions that can be invoked via a mouse click. You can replace these with macros of your own design. While the new mouse support helps, it would be far more effective if combined with true overlapping windows.

The long-awaited Undo/Redo capabilities of KEDIT are reason enough for you to upgrade. Using the Undo command, you can quickly and easily reverse the changes made to a file. The program groups your changes into units called Undo levels that can be reversed all at once. For example, if you is-

sue a command that affects 10 lines in a file, those 10 lines form an undo level. Then when you issue an Undo command, all 10 lines are restored simultaneously. The new Redo command can reverse the effects of the Undo command if you change your mind.

There are many other improvements, too. You can create simple dialog boxes in your KEXX macros that can use

push buttons and accept input. A new macro debugger greatly simplifies debugging KEXX programs. The macro language now supports a much larger subset of REXX functions

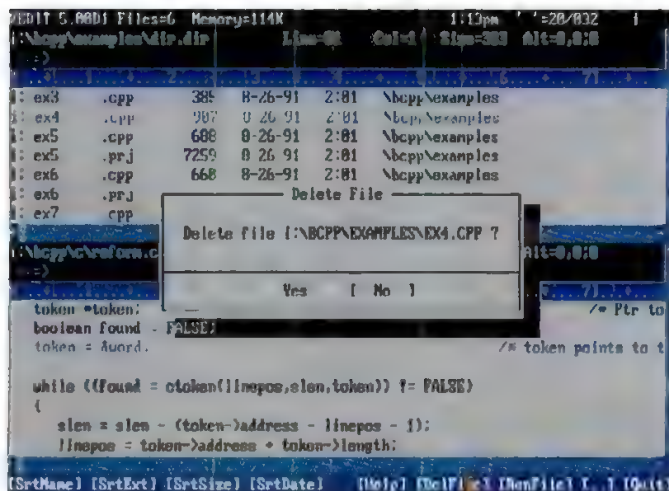
and commands, including PARSE. And the new hyper-text help facility supports the mouse and implements an on-line version of the KEDIT documentation. Another plus is that KEDIT automatically supports text display sizes up to 66 lines by 160 columns, which is a must if you're a user of Personics' UltraVision.

All in all, KEDIT's clean design is appealing, and its speed is addictive. While you won't find overlapping windows or sexy color-coded language constructs, KEDIT is a program that does one thing—ASCII-file text editing—and does it very well. □

• KEDIT, Version 5.0

List Price: DOS version, \$180; OS/2 version (including DOS version), \$210; upgrade from previous versions, \$45 (\$15 if KEDIT was purchased in 1992). Mansfield Software Group Inc., P.O. Box 532, Storrs, CT 06268; 203-429-8402.

Circle 451 on reader service card



KEDIT's new macro capabilities include the ability to create simple dialog boxes and assign functions to push buttons on a mouse bar.

FaxMaster...

Send. →

FaxMaster™ lets you send faxes anywhere in the world – anytime. Transform any Windows-based system into “Fax Grand Central,” in a way that will shame every overnight mail delivery service. Send faxes directly from your application without missing a beat – what you print is what you fax. Scan and fax paper documents – better than any fax machine – with one of *FaxMaster's* supported scanners. Put your best image forward by dropping in your company's logo and typeface – and send it anywhere, when rates are lowest.



Receive. ←

Who said it was better to send than receive? With *FaxMaster* you are alerted with each incoming fax. When you're ready to take a look, *FaxMaster* provides you with a “thumbnail” image of your incoming mail. Click on the *FaxMaster* Menu to view; and convert your fax into whatever format you happen to be running in your application at the time. In seconds, your incoming fax is up and running on your screen – ready for you to edit and save.



Most people think that sending and receiving faxes from a PC is just about the best thing to come along since sliced bread.

But what they don't always

notice is that once you get a fax, that's it. You read it and toss it in the waste basket.

That's why Caere® developed *FaxMaster* for Windows™, the only fax software that goes beyond the “fax paper wad,” by letting you change an ordinary fax into an intelligent one.

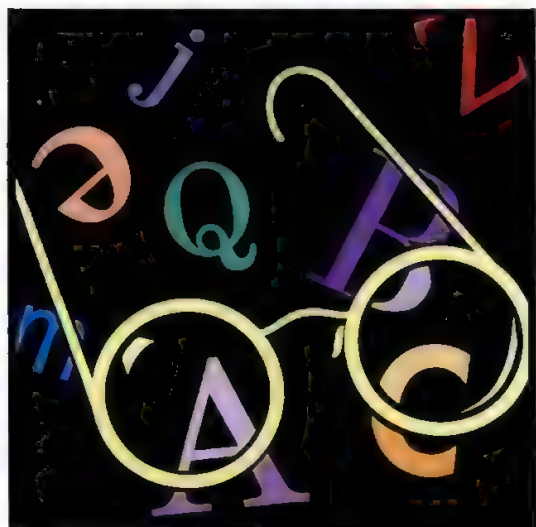
Other fax software gives you bitmapped faxes; or the ability to OCR only those faxes sent in “fine” mode. Only *FaxMaster* – which is based on the OCR industry standard, *OmniPage®* – has the ability to read both fine and standard-mode faxes. So you get the whole fax, and not just electronic alphabet soup.

With *FaxMaster* you can edit the faxes that you receive, or click on the “Export Text” icon and insert directly into your word processor. With *FaxMaster* you have the option to “compress” and save all of your faxes for later review.

The *only* complete fax solution.

OCR.

FaxMaster is the first fax software that lets you accurately scan (OCR) faxes electronically. Only *FaxMaster* is based on *OmniPage*, the industry standard, and only *FaxMaster* incorporates AnyFax™ technology, designed specifically to tackle poor quality fax OCR. *FaxMaster* lets you transform any fax into an intelligent one that you can move directly into your word processing document effortlessly – including low resolution faxes of newspaper articles and photocopied documents – regardless of font, font size or column format.



Compress.

There's no other fax software that lets you save faxes as economically and easily, without taking up all the available space on your hard disk. *FaxMaster* features Caere's proprietary SuperCompression™ technology, so the faxes you receive today will be available for you to view tomorrow. With compression rates as high as 15:1 over all other options, now you can afford to save those "off the record" faxes that might just pop back into your business at a later date.



Now you can send faxes in seconds anywhere in the world – at any time of the day. With *FaxMaster* you get all the convenience of a dedicated fax machine, with the interactivity of E-mail. And, you get the world's most complete fax software for only \$249.

Are you unsatisfied with your current fax software? For a limited time only, take advantage of Caere's Special \$99 Fax Master Upgrade Program. Call now at 1-800-643-3915.

Caere, OmniPage and the Caere logo are registered trademarks of Caere Corporation. FaxMaster, AnyFont and AnyFax technologies are trademarks of Caere Corporation. All other trademarks are of their respective companies. ©Copyright, 1992. Caere Corporation. All rights reserved.

CIRCLE 292 ON READER SERVICE CARD

Caere Corporation
100 Cooper Court
Los Gatos, CA 95030
1-800-643-3915



OVER 10,000 ITEMS • 2 RIVERVIEW DR • SOMERSET, NJ 08873 • FAX (908) 302-9730

The CallSoft Value:

- Same Day Shipping • Knowledgeable Staff
- No Extra Surcharge on Visa, M/C
- Corporate P.O., A.P.O., F.P.O. and International Orders Welcome

CallSoft

Estd Since 1982

TO ORDER CALL 1-800-777-5044

Software and Peripherals at Best Prices and Full Service

INTERNATIONAL CALLERS USE
1-908-805-0995
 (Mon-Fri 8:00AM - 8:00PM EST)
 OVER 10 DISTRIBUTION CENTERS NATIONWIDE

Accounting	CA-SuperCalc v5.1 (Special)..... 89
	Intuit QuickBooks..... 89
	Intuit Quicken Win..... 42
	Peachtree Complete III v5.0..... 139
	Reality Tech Wealthstar v2.0..... 33
Business Graphics	CA-Cricut Presents (Special)..... 119
	Aldus Persuasion v2.1..... 325
	Lotus Freelance Graphics v4.0..... 319
	Micrographix Windows Draw..... 95
	Power-Up! Calendar Creator Plus v4.0..... 49
	Software Pub. Harvard Graphics for Windows v1.0 (Special)..... 329
	SW Publishing Harvard Graphics v3.0..... 389
CAD	American Design CAD v4.0 3D..... 229
	American Design CAD v5.0 2D..... 119
	Autodesk AutoCAD v3.5 v12..... 295
	Autodesk AutoSketch v3.0 (Special)..... 140
	Autodesk Generic CAD v4.0..... 269
	Forstrix Draftix Cad Ultra v4.0..... 245
Communications	Hayes SM2400 SCEZ (Special)..... 259
	Supratex Modem Plus Int/Win..... 139
	Hayes Ultra 96/SCEZ v.42 Bis..... 549
	Hayes Optima 96/SCEZ (Special)..... 349
	Microcom Carbon Copy Plus v6.0..... 119
	Practical 2400 1/2 Card w/Share INTL..... 79
	Practical Peripherals 9600SA v.32 EXTL..... 289
	Cardinal MB2450 2400bps Int/Bitcom..... 49
	Everex Evercom 24 Int (Special)..... 69
	Prodigy Start-Up Kit v3.1 w/2400 bp..... 99
	Supratex Modem Plus DOS EXTL..... 129
	Symantec Norton PCAnywhere LAN v4.5..... 299
	U.S. Robotics Courier v32 BIS EXTL..... 549
	Zoom AMC 2400BPS v.42 INT..... 56
	Zoom 2400BPS w/RPI Modem EXTL..... 69
	Zoom FX9624 w/Windows 2.0 INTL..... 115
	Zoom FX9624 Send/Rec Fax w/Software EXTL (Special)..... 116
	Zoom FX9624 w/Win Fax v2.0 EXTL..... 122
	Zoom MX2400S w/4800 Sndfax & Software EXTL (Special)..... 69
Database	Borland dBASE III Plus v1.1..... 419
	Borland dBASE IV v1.5 (Special)..... 469
	Borland Paradox v4.0..... 79
	Buttonware PC-Fila v5..... 79
	Fox Pro v2.0 (Special)..... 459
	Foxbase v2 10..... 229
	Foxbase+ 386 v2 10..... 339
	Foxpro/Lan (Special)..... 519
	Microstar R-BASE v3.1..... 429
	SuperBase IV..... 459
	Symantec Q&A v4.0..... 249
	Word's Tech Arango Prof. (Special)..... 599
Desktop Publishing	Adobe Illustrator v4.0..... 395
	Adobe Type Fonts..... Call
	Adobe Type Manager Plus Pk..... 119
	Aldus Freehand Win v3.1..... 389
	Aldus Gallery Effects Win (Special)..... 129
	Aldus Pagemaker v4.0 Win..... 529
	Aldus PhotoStyler Win v1.1..... 499
	Corel Impact ACT 1.5 (Special)..... 509
	Corel Draw v3.0 Disk & CD..... 379
	Microsoft Publisher for Win..... 123
	Microsoft True Type Fonts Pack..... 49
	Microsoft Word for Win v2.0..... 289
	Z Soft PC Painterbrush IV+ (Special)..... 115
Home/Recreation	Broderbund New Print Shop Companion..... 29
	Individual Software Prof. Windows v3.1..... 29
	Learning Co. Operation Neptune..... 29
	Broderbund Where in Time (Special)..... 29
	Davidson & Assoc. New Math Blaster Plus..... 33
	Interplay Star Trek 25th Anniversary..... 37
	Accolade Jack Nicklaus Signature Ed..... 37
	Microsoft Ent Pack for Win. III..... 26
	Microsoft Flight Simulator v4.0..... 37
	Origin Sys. Ultima VII (Special)..... 44
	Accolade Hardball III..... 32
	Sierra On-Line Kings Quest V..... Call
	SMC Autopage..... 69
	SMC Autopage Europe..... 79
	SMC Orbis (Special)..... 39
	Broderbund Kid Pix..... 33
	The Learning Co. Reader Rabbit..... 29
	Softsync Expert Home Design..... 10
Integrated	Lotus Smart Suite (Special)..... 449
	Lotus Works (Special)..... 89
	Microsoft Office for Win v2.5..... 455
	Microsoft Works for Win v2.0..... 119
	Microsoft Works v2.0..... 90
	Spinmaker PFS First Choice v3.1..... 89
Operating Sys	Digital DR DOS v6.0..... 68
	IBM OS/2 v2.1 Upgrade..... 127/85
	Microsoft DOS v5.0 upgrade..... 59
	Microsoft Win 3.1 (Special)..... 88
	Microsoft Win 3.1 upgrade..... 47
	Novell Netware Uts..... 65
	Qualitas 386 Max v6.0..... 59
	Qualitas BlueMAX v6.0..... 79
	Quarterdeck Desqview 386 v2.4..... 119
	Quarterdeck QEMM 386 Mem Manager v6.0 (Special)..... 57
Programming	CA-Clipper v5.01..... 469
	Borland C++ v3.1 w/App Fram v3.0 w/video (Special)..... 489
	Borland Turbo C++ for Windows..... 99
	Borland Turbo Pascal v6.0..... 99
	Microsoft Fortran Compiler v5.1..... 289
	Microsoft Visual Basic (Special)..... 119
	Microsoft C Compiler v5.0..... 299
	Symantec Zortech C++ (Special)..... 419
Spreadsheets	Lotus 1-2-3 for Win v1.1 Comp Upgrade..... 95
	Lotus 1-2-3 for Windows v1.1..... 319
	Lotus 1-2-3 v3.1+ (Special)..... 389
	CA-Superproject..... 529
	Microsoft Excel for Win Upgrade v4.0..... 92
	Microsoft Excel v4.0 for Win..... 295
	Borland Quattro Pro v4.0 Comp Upgrade..... 89
Utilities	Berkley Syst After Dark for Win v2.0..... 27
	Central PC Tools 7.1 AntiVirus..... 149
	Central PC Tools v7.1 (Special)..... 115
	Central PC Tools Deluxe Lan 10pk v7.1..... 785
	Lotus Lambert Close-Up (Special)..... Call
	Stac Software Stacker A/16..... 179
	Stac Software Stacker v2.0 (Special)..... 79
	Symantec Norton Antivirus v2.0..... 79
	Symantec Norton Desktop for Win v2.0..... 95
	Symantec Norton Utilities v6.0..... 119
	Travelling Software Linktop for v4.0..... 99

Word Proc.	Microsoft Word for Win v2.0..... 289
	Individual Software Resumemaker..... 29
	Lotus Ami Pro v3.0 Upgrades..... 89
	Lotus Ami Pro & 1.2.3 for Windows Jpgd..... 149
	Que Soft Rightwriter for Win v5.0..... 59
	Reference Grammar 5 DOS or Win..... 109
	Software Pub. Corp. Profess and Write v2..... 169
	WordPerfect for Win v5.1..... 259
	WordPerfect v5.1..... 265
CPU's	AIR PowerFLEX 386SX 25MHz..... 929
	AST Bravo II 386SX 20MHz..... 1029
	AST Premium II 386SX 2.80..... 1599
	P5/2..... Call
	Wyse 3016SX 01 1.2 Meg, 5.25"..... 639
	Wyse Decis on 386SX 20 mhz no drive..... 899
Connectivity	3 Com Etherlink II TP Adapter..... 215
	Eagle Tech NE 1000 Ethernet Card..... 122
	Eagle Tech NE 2000 Ethernet Card..... 169
	16bit net Cable..... 129
	Inte. EtherExpress 16TP..... 129
	Stand Micro System Ethernet Elite 16 Combo..... 215
	Stand Micro Sys Ethernet Plus Elite 16T..... 179
Monitors	Grastor 1460 Plus 14"..... 289
	Magnavox Super VGA 14", 28"..... 309
	NEC MultiSync 3FGX Flat Screen 15"..... 659
	NEC MultiSync 2A 14" Super VGA..... 399
	NEC MultiSync 4FG Flat Screen 15"..... 799
	Packard Bell PB8539VG 14" VGA..... 239
	Samsung M4571 14" VGA White..... 119
	Samsung Syncmaster 3 14" Super VGA..... 309
	Wyse Tech Wyse 150 14" Termino w/o Kbd Amr/Gm. Whi..... 289
	Wyse Tech Wyse 60 14" Termino w/o Kbd Am. Grn. Whi..... 299
Storage/Drivers	Colorado Mem Systems Jumbo 120 MB..... 199
	Colorado Mem Systems Jumbo 250 MB..... 259
	Philips CM2C 5XRS w/CD Rom w/Grolier En (Special)..... 379
	Philips CM 0538X CD Rom..... 349
	Sydex 888 Internal Drive w. 8 Bit Adapt..... 509
	NEC CD 84 PS2 MPC (Special)..... 669
	Quantum Microzone 8X 105MB..... 439
	Seagate ST3144A 130MB 3.5 IDE..... 359
	Tosac 3.5" 1.44MB Floppy Disk Drive..... 59
	TEAC 5.25 1.2MB Floppy Disk Drive..... 59
	Toshiba 1.2MB 5.25 Floppy (Special)..... 69
Accessories	Kensington Masterpiece (Special)..... 89
	Logitech Dextra Mouse w/9.25 Pin Adapter..... 19
	Logitech Mouseman Bus..... 69
	Logitech Mouseman Serial PS, 2 w/Win 3.1..... 109
	Logitech Trackman Portable..... 95
	Microsoft Bus Point Mouse..... 114
	Microsoft Bus Mouse w. Win Ser PS/2 Bus..... 147
Printers/Scanners	Canon B) 10EX Gry. Wm..... 319
	Canon B) 300 B) Co 24 Wire..... 429
	HP II..... 1579
	HP III..... 1159
	HP III w/Postscript..... 699
	HP III Plus..... 849
	HP Scanjet 4C AT w/MCA..... 1499
	HP Scanjet II AT w/MCA..... 1239
	Kodak Dicomax 181X Printer Par. Ser..... Call
	LexarMaster W. n. 800..... 1299
	LexarMaster W. n. 800..... 389
	Logitech Scanner 256 (Special)..... 269
	Logitech Scanner 4..... 125
	Okidata ML-320 Printer..... 309
	Okidata ML 321 Printer..... 439
	Okidata ML 380 Printer..... 219
	Okidata OJ 43C Printer..... 609
	Okidata OJ 831 Printer..... 1299
	Okidata OJ 840 Printer..... 1599
	Panasonic KXP1124 24Pin/80 Col..... 199
	Panasonic KXP1180..... 169
	Panasonic KXP1654 Dot Matrix..... 559
	Panasonic KXP2624 Jetset Tech..... 399
	Sharp X 32C Microchannel interface..... 699
	Sharp XJ320 Cam. Scanner..... 299
	Sharp XJ320 DOS Interface (Special)..... 599
Laptop/Notebook Computers	AST Exec 386SX 20 63V..... 1999
	AST Exec 386SX 25 63V..... 2909
	4MB Cam..... 3199
	AST Exec 386SX 25 83V..... 2099
	4MB Cam..... 3199
	Toshiba T2200SX 8..... 2099
	Toshiba T3300SX 2..... 2599
	Toshiba T3300SX 8..... 2199
	Toshiba T4400 SX 80..... 4499
	Toshiba T4400SX 80 -CD..... 2799

MULTICALC



MultiCalc by PC Works Inc. is a comprehensive loan amortization, depreciation, and financial computing system that is currently unequalled in features, performance and ease of use.

\$59

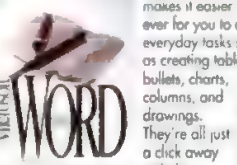
Smart Suite



Smart Suite from Lotus is four full featured, powerful business applications 1-2-3 for Windows spreadsheet, Ami Pro word processor, Freelance Graphics presentation graphics package and cc-Mail electronic mail.

\$449

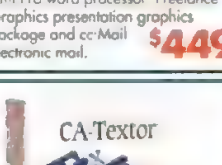
Microsoft Word



Microsoft Word makes it easier than ever for you to do everyday tasks such as creating tables, bullets, charts, columns, and drawings. They're all just a click away with the Toolbar™. You can create envelopes or check your spelling with a mouse click, too. Microsoft Word for Windows—everyday made easy!

\$289

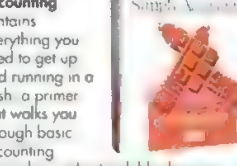
CA-Texttor



CA-Texttor offers an easy to use feature rich user interface that incorporates select features such as pull down menus, pop up dialogs and a user-configurable tool bar, which gives you simple and direct access to the many powerful features of CA Textor.

\$129

ACCAC Simply Accounting



contains everything you need to get up and running in a flash: a primer that walks you through basic accounting principles, understandable documentation, software that includes a real-life tutorial with sample data; and six different modifiable charts of accounts.

\$109

OS/2 is more than a new version. It's a new vision. A true operating system that takes your DOS, Windows and OS/2 applications beyond the limitations of the past and lets you do more with them than you ever could with DOS or DOS with Windows.

\$125

Please call for any item not listed. We have an extensive inventory to cover all your needs. We are a Novell authorized dealer. Please call for any Novell or Networking product. We are also a Lotus authorized dealer. Call for any Lotus software needs.

Call for any item not listed. We have an extensive inventory to cover all your needs. We are a Novell authorized dealer. Please call for any Novell or Networking product. We are also a Lotus authorized dealer. Call for any Lotus software needs.

Call for any item not listed. We have an extensive inventory to cover all your needs. We are a Novell authorized dealer. Please call for any Novell or Networking product. We are also a Lotus authorized dealer. Call for any Lotus software needs.



Michael J. Miller

The Compatibility Curse

Compatibility has built the PC business. It's also stalled the software business. Think about this. If we've got 32-bit desktop systems, why are we running software that's stuck with the limitations of 1981 hardware design?

The answer is simple. Since hardware vendors have made sure their machines can run all the software written for the IBM PC standard, we've seen hundreds of companies make compatible machines. This has pushed prices down and spurred innovation. And since software developers have written applications that work on all these machines, we have tens of thousands of applications to choose from.

Compatibility can also be a curse. Most of us have loaded our 386- and 486-based machines with an operating system designed for 11-year-old PCs. Today's machines have much more power under the hood than the first IBM PCs, including 32-bit processing and a large, flat memory space, but the inertia of the installed base has worked against equally revolutionary changes to the operating system.

How can the industry respond? Basic compatibility with existing applications isn't enough. Only great new software that goes beyond today's standards will make a compelling case for users to dump their current operating systems and pledge support for some alternative.

THE NEXT SURE THING

MS-DOS became popular because it worked, because it was inexpensive, and especially because applications were developed for DOS and not for its original competitors. Software for just about any need was developed.

Microsoft has since dominated the PC operating system world because DOS (and IBM's modification, PC-DOS) was the only one that ran all this great software.

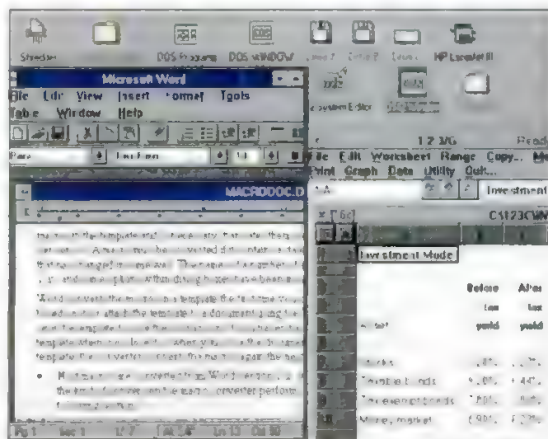
Only in the past few years has there been a real competitor: DR DOS.

Microsoft's continued domination in operating systems isn't a sure thing. People who talk about Windows NT as if Microsoft were an unstoppable juggernaut point to Microsoft's success with DOS and Windows, but the terrain has changed; Microsoft won't hitch the free ride it has had in the DOS world. There are plenty of 32-bit, multitasking, multi-threaded systems, and more are moving to the PC platform: OS/2 2.0, SCO Unix, and new Unix derivatives, including UnixWare, Solaris, and NextStep. This time out, vendors will give compatibility top priority, but compatibility alone won't make an operating system fly. People want applications.

Look at Windows. Though its graphical user interface, multitasking ability, Clipboard, and DDE support are powerful, what makes it work for me is the quality and quantity of Windows applications. Ami Pro, Word for Windows, and WordPerfect for Windows are arguably the three best word processors for any platform.

Microsoft Excel and Quattro Pro for Windows are top-notch spreadsheets. The presentation graphics category is packed with contenders that'll make you forget DOS applications: Aldus Persuasion, Freelance Graphics for Windows, Harvard Graphics, Microsoft PowerPoint for Windows, and Stanford Graphics. Desktop publishing and illustration packages for the PC are also dominated by Windows applications.

These applications



Sure, you can reliably run existing DOS and Windows applications in OS/2, but is that enough?

COLUMNIST PHOTOGRAPHS BY PETER GREGG

Michael J. Miller

can't hide the fact that Windows is running on top of an outdated operating system. Although Windows applications are not bound by the 640K limit, DOS applications running under Windows still are.

I've set up my computer to load software that enables my Token-Ring board, NetWare connection, CD-ROM drive, and sound board. Even using all the tricks of the trade, such as installing a memory manager and loading DOS high, I still find that some of my larger DOS applications don't fit into a DOS window. Load an antivirus program, a smart undelete command, DOSKEY, or Stacker and things only get worse. I feel like shouting to developers: "Hey, I've got a 32-bit system here. Why the limitations?"

CLINGING TO DOS

The question itself points to DOS's staying power. Most of us still run DOS programs or exit to DOS to run utilities or

applications that don't yet exist for Windows or are simply much faster under DOS. Great Windows databases aren't here yet, and while there are some great Windows-specific utilities, for some things you simply need the DOS prompt.

There's the rub. We want the power of a new operating system, yet we also want to run all those old familiar applications. The lack of compatibility is why OS/2 1.x failed and why Unix has met with very limited success in converting PC desktops. Today, the issue is not just compatibility with DOS applications but with Windows applications as well.

That's why many people look at Microsoft's plans for Windows NT and think it's the answer: a 32-bit multitasking, multithreaded operating system that is supposed to run the old DOS and Windows applications. The idea is a seductive one, but until the operating system is finished, we won't know how well it will run them.

IBM's OS/2 2.0 has led the way, with its "seamless Windows" feature for running Windows applications. While the

system runs DOS programs quite well, it could run Windows programs much better and faster than it does. At the least, OS/2 addresses the issues of compatibility with DOS and Windows applications. And Windows NT and other OS vendors seem committed to walking down the same path.

WHEN TO LET GO

Compatibility is only a first step. No emulation, no "DOS box" will ever do more than remove the objection of incompatibility. Programs will need to support networking in a far more integrated way than they do today. They'll need to handle new kinds of data, such as sound, video, and animation. They'll have to be very customizable, very adaptable, very intelligent. They'll have to work together as "objects" or tools in a more object-oriented environment of the future. And above all, they'll have to be better, faster, and easier to use than today's applications.

Then and only then will customers be able to put DOS behind them. □



*Return this ad, or a copy of it, together with your proof of purchase and Power Pak registration card for a \$10 rebate directly from PC-Kwik Corporation. Offer valid only for US English language products. Not valid with any other mail-in offer. Void where prohibited.

Triple The Speed Of Your Computer

With PC-Kwik Power Pak you can dramatically improve the performance of your computer, whether it's an XT or a 486. Disk, screen, keyboard, printing, and command-line entry is up to ten times faster! It's like getting a newer, faster computer for a fraction of the cost.

FREE SOFTWARE AND \$10 BACK! For a limited time, specially marked boxes of Power Pak include a free copy of PC-Kwik Power Disk, our award-winning disk optimizer. There's even more good news! Make your purchase between now and October 31, 1992, and we'll send you \$10*.

ONLY
\$85

FREE
GROUND
SHIPPING

1-800-289-3878

OR FAX

1-818-884-5310

Call Toll Free in the U.S.A. Monday Thru
Friday 6AM to 5PM PST

20969 Ventura Boulevard, Suite 13
Woodland Hills, CA 91364 818-710-9174
Limited time offer
Prices subject to change without notice

DUSTIN
DISCOUNT SOFTWARE

Plain Wrap Prices,
Black Tie Service.

PCM9

CIRCLE 168 ON READER SERVICE CARD

KING OF THE ROAD



Multi-Tech's New Data & Fax Modem for Laptop PCs

When you're in your office, you want power and performance from your modem. So why settle for less when you're on the road?

With the MultiModem[™], smaller is better.

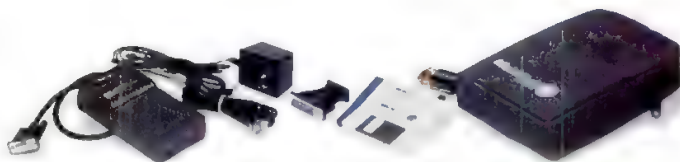
Until now, "pocket modem" usually meant small size, with small features, less LEDs and poor flexibility. But with the new MultiModem[™], you get a state-of-the-art modem, with data speeds up to 14,400 bps (up to 56,000 bps compressed), and send & receive fax capability at 9600 or 4800 bps. You also get twelve LEDs and a speaker, so you'll know what's going on.

The MultiModem[™] runs on either AC or battery power, so you can transfer files and send or receive faxes at the office, from home, or on the road. You also get remote configuration, UNIX[®] support and "flash PROM" updating from our BBS.

All This, and Free Software Too!

We include everything you need to hit the road running, including our MultiExpress[™] data and fax communications software. And if you're an Apple[®] PowerBook[®] user, we've got a version for you, too.

For more information, please call us at 1-800-328-9717.



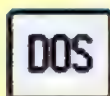
MultiTech[®]
Systems

The right answer every time.

Trademarks: MultiModem, MultiExpress, MultiTech: Multi-Tech Systems, Inc.; UNIX: UNIX System Laboratories, Inc.; Apple, PowerBook: Apple Computer Corp.
Copyright © 1992 by Multi-Tech Systems, Inc.

Multi-Tech Systems, Inc., 2205 Woodale Drive
Mounds View, Minnesota 55112 U.S.A.
(612) 785-3500, (800) 328-9717, U.S. FAX (612) 785-9874
International Telex 4998372, International FAX (612) 331-3180

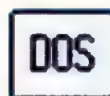
☐ DOS Programs - Icon View



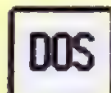
Harvard Graphics



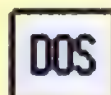
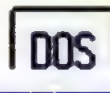
Quicken



Peachtree Accounting



CA-SuperCalc



Quattro Pro

☐ Windows Programs - Icon View



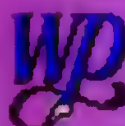
PageMaker



Ami Professional



CA-dBase



WordPerfect

☐ OS/2 Programs - Icon View



CorelDRAW!



Accounting Vision/32



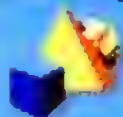
PC/Data Access
Control System



DeScribe



Enfin/3



ObjectVision



PFS: Works



Publisher's
Paintbrush



OS/2 System



Master Help
Index

OS/2



Start Here



Information



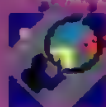
IBM Laser
Printer



Shredder



Designer



Freelance
Graphics

W



-2-3 for OS/2



Applications
Manager



Lotus Notes

NJOY
The World of
Objects



SPANS M P



There's a place in this world for DOS and Windows.

And you're looking at it.

OS/2® 2.0 isn't about leaving your DOS and Windows™ applications behind. It's about moving them ahead—doing more with them than ever before.

Now you can run DOS, Windows and OS/2 applications at the same time, in separate windows on the same screen. Create a new letter while using your fax/modem. Print charts as you calculate a complex spreadsheet. Even “cut and paste” between *any* applications—and more. But OS/2 doesn't just enhance your current applications. It protects your investment in them. And preserves your choices as more become available, including new 32-bit applications.

But maybe the best part is that for less than the cost of DOS and Windows, you get the capabilities of both. Plus all the added benefits of OS/2 2.0—including Adobe Type Manager.™ So with OS/2 2.0, whatever applications you use, you've come to the right place. For an IBM authorized dealer near you, or to order OS/2 2.0 from IBM—at special promotional prices of \$79 for Windows users and \$99 from any DOS—call 1 800 3-IBM-OS2*.

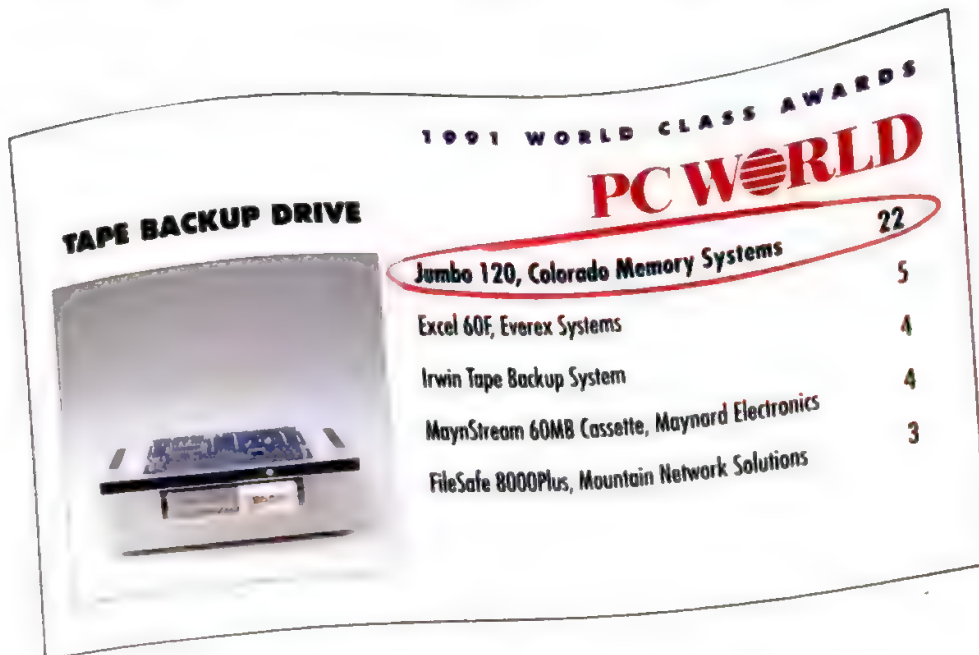


Introducing OS/2 2.0.

- Runs DOS, Windows and OS/2 applications from a single system.
- Supported on most IBM-compatible 386 SX PCs and above.
- Up to 48MB expanded memory per application. No 640K limit.
- Workplace Shell™: an easy-to-use, graphical interface.
- OS/2 2.0 upgrade: \$79 from Windows, \$99 from any DOS.**

CIRCLE 024 ON READER SERVICE CARD

World class performance.



Rock bottom price.

Now, just \$250.

Winning the World Class Award in tape backup was great news! So is our new low price. Because both simplify your tape-drive decision. Jumbo is simply the obvious choice. Particularly since the competition isn't even close...in performance or price. Jumbo topped PC World's list of backup tape drives by a 4-to-1 margin. In poll after poll, Jumbo consistently comes out on top. So why not go world class?

You'll save money in the process.

Choose either Jumbo 120 (120 MB with data compression) or Jumbo 250 (250 MB with data compression). Both give you QIC compatibility, Novell® certification, and UNIX®/Xenix® support. Call 1-800-451-0897, ext. 151 today for a free brochure.



**COLORADO™
MEMORY SYSTEMS INC.**

800 S. Taft Ave., Loveland, CO 80537

Chart based on data compiled by PC World Magazine, October 1991. © 1991 PC World Communications, Inc.
Novell, UNIX and Xenix are registered trademarks of their respective companies. © 1991 Colorado Memory Systems, Inc. All rights reserved.
CIRCLE 026 ON READER SERVICE CARD



Bill Machrone

Kiss and Make Up

IBM and Microsoft are Splitsville. The divorce is final. So now it's about time for the two of them to get back together again. This will be especially hard for IBM, because it has to swallow its pride and support Windows NT.

OS/2 is a terrific operating system. In many ways, it's better than Windows 3.1, but OS/2 versus Windows has never been a valid comparison. OS/2 2.0 is the direct precursor to Windows NT. When IBM and Microsoft split, incredible as it may seem, Microsoft got to keep the new stuff and IBM got stuck with the old stuff. The new stuff is everything OS/2 is, and much more. Remember, Windows NT was called OS/2 3.0 not so very long ago.

IBM believes that it needs to control its own destiny in desktop operating systems, as it does in its other lines. I believe that IBM has to offer its customers the best operating system, regardless of the source. In 1993, that operating system will be Windows NT, not OS/2. IBM's supporters are warbling the chirpy refrain, "OS/2 is here, now." Meanwhile, the NT orchestra is warming up to play Wagner. Call me a monopolist, but I think it's time for an advanced operating system with a single point of control: Microsoft. Opposing arguments devolve into not wanting to make Bill Gates any richer. The industry begrudges Microsoft its success, and it's no wonder. Microsoft has won the war on all battlefronts: technological, economic, and philosophical. It hasn't been a gracious victor.

The idea of a computer company owning an operating system in order to give customers a proprietary advantage is obsolete. Once NT ships, OS/2 will always be a generation behind. Customers won't stand for it. IBM may think it can ride out the storm until Taligent ships its object-

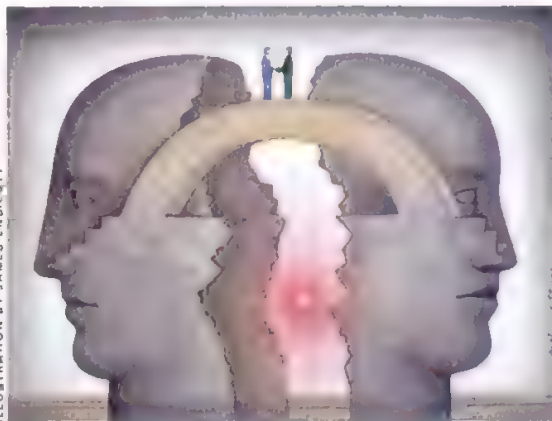
oriented operating system. I wouldn't bet on it.

OS/2's Workplace Shell is a positive step toward greater ease of use and object orientation at the user level. IBM's game plan is to move customers and developers from WPS to Taligent's new operating system, which will run on high-end Intel-based machines and the Power PC chip, a RISC-based microprocessor derived from the hot RS/6000 line. IBM has teamed up with Apple and Motorola, proving that difficult times call for extreme measures.

They're playing without a safety net. If Taligent is a year or two late, as new operating systems and processors are wont to be, IBM won't have an upgrade path for its customers. Instead, IBM should adopt NT for its current top-of-the-line machines, and port the Workplace Shell to it, thus protecting the efforts of OS/2 developers and their commercial customers who have already committed to OS/2. Then the folks at IBM should work with Microsoft on porting NT to the RS/6000 line. They'd have it up and running at least a year sooner than Taligent.

For the first time, IBM would have the same operating system running on two of its product lines, which would allow its customers to mix and interoperate them at will.

Windows NT is the new open system of choice. Unix has failed in its mission as the ubiquitous operating system, brought down by 200 open systems vendors who can't resist the little proprietary tweaks that stop cross-platform compatibility dead in its tracks. Unix has failed IBM, too. AIX may be



OS/2 is here now, but Windows NT is warming up to play Wagner. How can IBM protect its customers?

Hassle-Free Printer Sharing

Now...ServerJet™ Technology for Any Printer!



You loved the features and compact size of our popular *ServerJet*, PC Magazine's "favorite solution for sharing LaserJets." But you need a solution that will work with any laser, dot matrix or other standard parallel printer.

It's called the *JetWay*.

Stretch up to hundreds of feet of telephone-type cable from your PCs to the *JetWay*. Plug your printer cable into the *JetWay* and plug in the power cord. If you're tight for desktop work space, just slap the video cassette-sized *JetWay* onto the side of your printer.

Then, up to eight people can simultaneously *whooooosh* documents to a printer at the "jet speed" of 115,200 baud – for less than \$69 per user.

It's that easy. Here at ASP, we call it "hassle-free." We use it as an ingredient in all of our products.

No more wandering down the hall with diskette in hand.

Or borrowing someone else's printer.

Or wasting time waiting to print.

The *JetWay* is available in a variety of models with up to 4MB of buffer memory to spool your print jobs.

Take off with a *JetWay* and watch your productivity soar!

To order your *JetWay*, or for a FREE catalog of our full line of printer-sharing solutions, call ASP at:

800-445-6190

Dept. 92086

International 408-746-2965

ASP

ASP COMPUTER PRODUCTS, INC.

160 San Gabriel Drive, Sunnyvale, CA 94086, USA
Telephone: 408-746-2965 • Facsimile: 408-746-2803

JetWay and ServerJet are trademarks of ASP Computer Products, Inc. / LaserJet is a registered trademark of Hewlett-Packard Co.

CIRCLE 111 ON READER SERVICE CARD

Bill Machrone

one of the most advanced versions of Unix, but IBM seems quite willing to toss it on the scrap heap.

IBM still holds a lot of cards as a small-systems vendor, and its advantages synergize well with Windows NT. Though IBM doesn't dominate the field as it once did, it's still the largest PC vendor and stands alone as a worldwide manufacturer with vast resources, vertical integration, a huge patent portfolio, and a direct line into virtually every large company. Remember, too, that it has a 10-year license to produce the 386, 486, and "other Intel processors" for internal consumption.

IBM knows hardware. I've said before that only a handful of companies know how to design a proper cache, and IBM is one of them. An Intel executive recently concurred, confiding, "There are a lot of 'marketing caches' out there," meaning that many manufacturers' cache designs are ineffectual, but they sell them anyway to be competitive in the marketplace. Cache design becomes more important as we move to symmetrical multiprocessor (SMP) machines. IBM knows SMP, too. Pardon my stridency if I remind you that NT is designed for SMP.

IBM is motivated. The company has been through some wrenching dislocations as it has downsized to match its flagging fortunes in mainframe and midrange computing. There's more pain to come, but this company has reinvented itself a number of times over the decades. This is the same company that used to make time clocks, slicing machines, and meat grinders. I think IBM will do it again. The old conventional wisdom was that nobody ever got fired for buying IBM. The new conventional wisdom may be that nobody ever went broke enlisting legions of motivated IBMers to their cause.

IBM has a weakness: its size. We've all heard the supertanker analogies. IBM has to jettison legions of mid-level paper pushers and a few layers of superannuated aristocrats. It needs to use that *entre* into corporate America wisely, and soon, before it's gone. In the end, the new IBM won't adopt NT because it's inevitable. IBM will do it because it's the best choice for the company and its customers. □

The Kodak Diconix 701 printer. It's the mobile printer that delivers affordable laser-quality 300 dpi text and graphics, in less desk space than a sheet of paper.

The Kodak Diconix 701 printer delivers desktop quality that makes your communications, and you, look good. Yet it needs only 7.4 x 11.7" of desk space, even with the ingenious 30-page built-in paper feeder. It's a compact ink-jet printer, in the award-winning Diconix tradition, quiet, easy-to-use, sleekly handsome. And it prints up to three pages per minute.

At less than 6 lbs., including the optional battery, this is the definitive mobile printer. Use it at the office, at home, or anywhere in between. Wherever you work, don't wait: call for the name of a dealer near you in the U.S. and Canada. 1 800 344-0006, Ext. 413.

**LASER QUALITY.
COMPACT DESIGN.
MOBILE PRINTING IS HERE.**

KODAK

Kodak Diconix 701 printer



"EASY-TO-USE" ACCOUNTING PROGRAMS

For years, unsuspecting small business owners have bought accounting software that claims to be simple — only to have their hopes dashed time and time again!

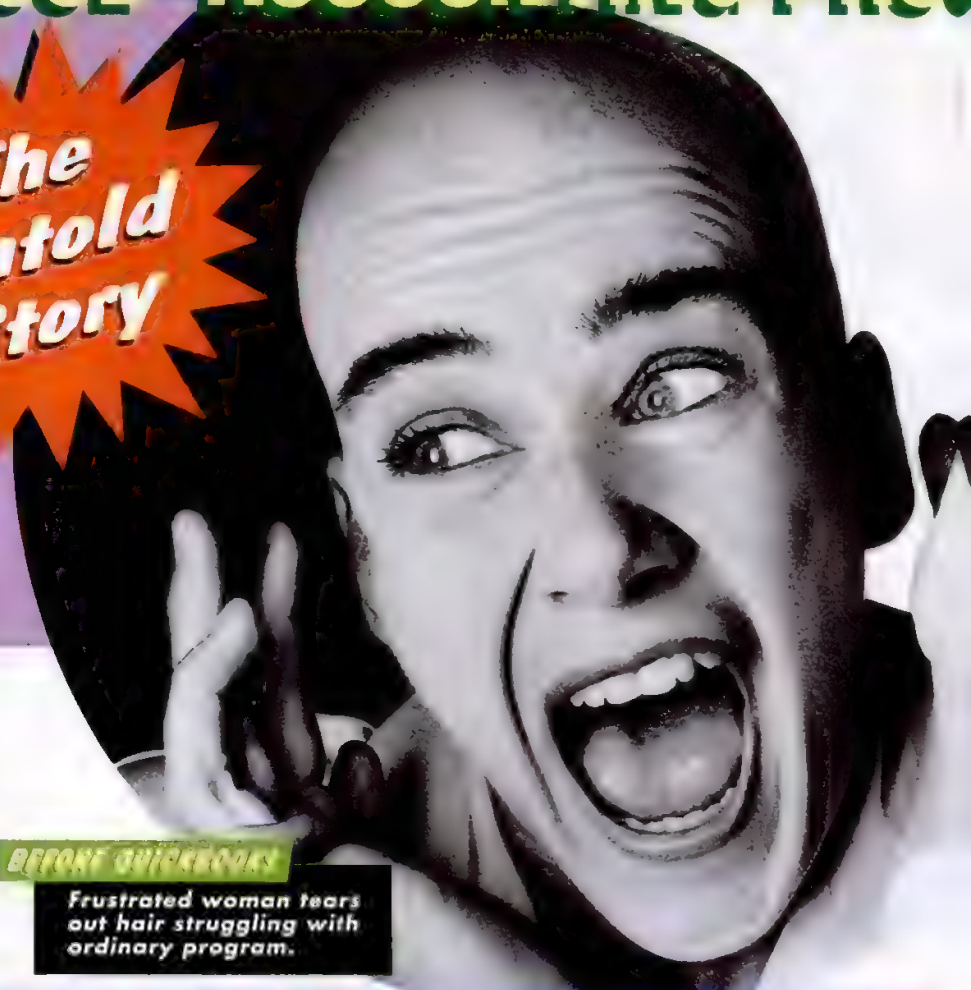
The Untold Story

The facts show that these programs are not simple at all. In fact, the average buyer tries as many as three accounting programs without satisfaction.

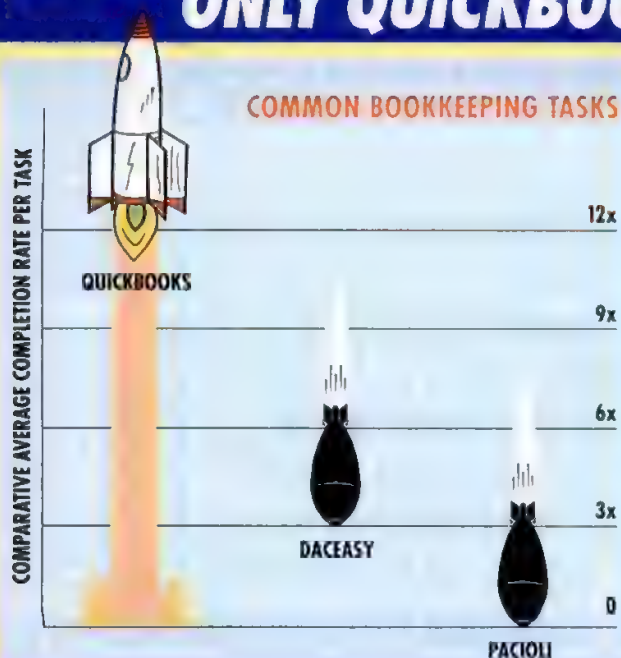
That's why the people at Intuit decided it was time to put a stop to these falsehoods and the needless suffering they cause.

BEFORE QUICKBOOKS

Frustrated woman tears out hair struggling with ordinary program.



CONSUMER TESTS REVEAL THE SHOCKING TRUTH: ONLY QUICKBOOKS IS TRULY EASIER!



QuickBooks proven 12 times easier.

New QuickBooks for the PC is the first small business accounting program to actually *prove* it's easier than anything else on the market.

In fact, an independent research company has shown QuickBooks to be *12 times easier* than DacEasy® and Pacioli 2000®, once the best-selling programs available.

The researchers tested 90 ordinary small business bookkeepers. No accountants. No computer wizards.

The participants were given 11 of the most com-

mon accounting tasks, like writing checks or invoicing customers.

Those using QuickBooks successfully completed all the tasks 12 times more often than the ones using DacEasy. As for Pacioli, *not one person* was able to complete all the required tasks.

We'd be happy to send you a summary of the independent study. Just send your request to:

QuickBooks Test Results, Intuit, P.O. Box 3014, Menlo Park, CA 94026-3014.

GRAMS EXPOSED AS GIANT HOAX!

WHOLE NEW CATEGORY OF ACCOUNTING SOFTWARE DISCOVERED!

**Experts Are Amazed!
Small Business People
Suddenly Perform Miracles
With QuickBooks!**

Why did QuickBooks succeed where other leading programs failed? Because QuickBooks works the way you do. Transactions are entered once and only once. When you want to write a check, you fill out a screen that looks just like a check. To invoice a customer, you fill out an on-screen invoice. There are no debits or credits. If you make a mistake, QuickBooks lets you go back and fix it anytime.

Then QuickBooks does the rest to give a complete financial picture of your business. Choose "Reports" from the "Main Menu" and in seconds you'll have a Collections report detailing who owes you money. Forecast cash flow needs for the rest of the year with a unique Cash Flow report. You can even customize a report and memorize it to use again and again.

Getting started — probably the greatest hurdle of all — is much, much easier with QuickBooks. Just choose from over 20 pre-defined charts of accounts.

"This is a great program if you're more interested in running your small business than becoming an accountant." PC WORLD

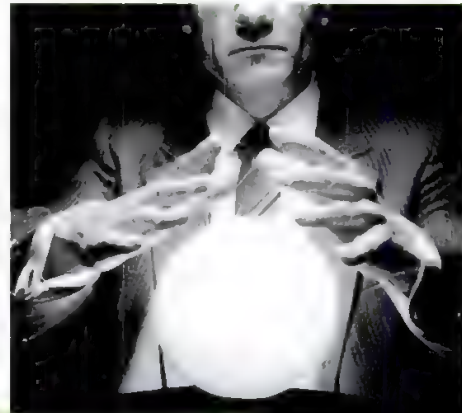
- **manage & track** checks, invoices & statements.
- **manage** bills and payments as they're received.
- **manage** accounts.
- **manage** cash flow.
- **manage** accounts receivable with collection reports and receivable aging reports.
- **manage** sales in any manner needed — by product, service, customer, type of customer, time period, or employee.
- **manage** balance sheets, profit and loss statements, accounts payable aging, budgets, payroll reports, project tracking reports and sales tax owed reports.
- **manage** custom report formats to use again and again.

And QuickBooks is easy to learn. There are on-screen tutorials, pull-down menus, and if you're stuck, an "assistant" will automatically pop up on the screen to help you.

Need more help? QuickBooks is the only leading accounting software offering unlimited free phone support to registered users.

"QuickBooks, from Intuit, is the easiest of the accounting programs so far. The words debit and credit, along with a lot of accounting jargon, are shunned in favor of a system of familiar fill-in-the-blank forms." NY TIMES

"QuickBooks strips away confusing terminology as it handles invoicing, accounts receivable, accounts payable, and some payroll functions to small and home based businesses. It's extraordinarily easy to use, yet provides plenty of accounting power." PC MAGAZINE



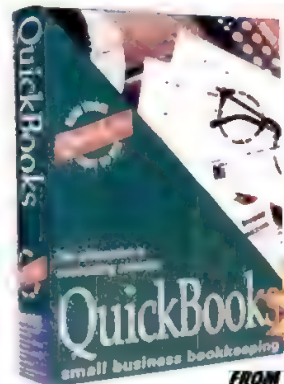
Businessman in Peoria no longer needs crystal ball to predict his profits and losses. QuickBooks tells all in seconds!

Amazing? Yes. But no more than anyone would expect from the makers of Quicken, far and away the most popular, most trusted, and most honored personal finance software in the world.

Order now and you'll get two FREE bonus gifts!

Order QuickBooks now for \$139.95, or QuickBooks and QuickPay for \$179.95, and you'll also receive DoubleDisk™ and ViruSafe™ for FREE (a \$229.90 combined retail value). Don't waste money on another expensive hard drive — get twice the disk storage space with DoubleDisk. And protect your computer with ViruSafe, the most complete virus safety system.

1-800-624-8742



\$139.95

FROM THE MAKERS OF Quicken®

INTUIT P.O. Box 3014, Menlo Park, CA 94026



Man sees children for first time in months. QuickBooks saves another American family!

FINALLY...AN AFFORDABLE COLOR NOTEBOOK.

Choose your package—or we can custom-build to your specifications!

PACKAGE #1 ONLY \$2695

- 386SL-25 MHz CPU with 64K cache.
- 2MB RAM.
- 60MB high-speed IDE hard drive.
- Built-in high-density (1.44MB) 3.5" floppy drive.
- High-res 640x480 passive matrix color VGA LCD.
- A slim 8.5x11.3" in size; total system weighs only 6.7 lbs. with battery!
- Light, slide-in, slide-out NiCad battery.
- 2.5 hours of battery life typical; more with power management.
- Trickle-charge or one hour quick-charge. Extra battery packs available.
- Suspend/resume—even in Windows.
- When battery runs low you can change batteries without having to shut off the system!
- 85-key keyboard with embedded numeric keypad, 12 dedicated function keys, and true 101-key emulation. Inverted T cursor layout.
- Serial, parallel, keyboard and external video ports.
- Math coprocessor support.
- 30-Day Absolute Satisfaction Money-Back Guarantee and complete ZEOS Customer Satisfaction Package.
- One Full Year Limited Warranty.
- 24-Hour-a-Day Toll-Free Technical Support. 365 Days a Year.

PACKAGE #2 ONLY \$3295

Load up your Notebook! We've included free software, internal send/receive fax modem and more...all at an incredible price.

- 4MB RAM.
- 60MB IDE hard drive.
- Internal send and receive fax modem.
- Custom-fitted carrying case.
- Genuine Microsoft Mouse.
- MS-DOS 5.0, Windows 3.1, and your choice of two Windows applications. Choose from Lotus 1-2-3 for Windows, Ami Pro and Freelance Graphics for Windows.

PACKAGE #3 ONLY \$3895

Go to 8MB of memory. 130MB hard drive, extra battery...this could be the only PC you'll ever need!

- 8MB RAM.
- 130MB IDE hard drive.
- Internal send and receive fax modem.
- Custom-fitted carrying case.
- Additional NiCad battery.
- Genuine Microsoft Mouse.
- MS-DOS 5.0, Windows 3.1, and your choice of two Windows applications. Choose from Lotus 1-2-3 for Windows, Ami Pro and Freelance Graphics for Windows.

ORDER NOW TOLL FREE
800-423-5891

Fax Orders: 612-633-1325
Government: 800-245-2449
Outside U.S. and Canada: 612-633-6131
Hearing Impaired (TDD): 800-228-5389
MasterCard, VISA, Discover, American Express, Z-Card,™ COD and Leasing Programs.

Open 24 Hours a Day, 365 Days a Year.

Powerful, Colorful, Light & Loaded.

NEW
LOWER
PRICES!

The New Color Notebook from ZEOS.[®] Only \$2695!

Remember what a difference it made when you switched to a color desktop? With the new ZEOS Color Notebook, you'll enjoy vivid colors from a palette of 256 on your full-size 9.5" display. And there's more.

✓ Fast drives and loads of storage with hard disk right up to 130MB. ✓ Unbelievable 25MHz SL performance, coupled with our 64K built-in cache. Standard. ✓ Up to 20MB of high-speed RAM for the most demanding applications. ✓ A built-in high density 1.44MB 3.5" floppy drive. ✓ Serial, parallel, external VGA and keyboard ports. Use your system as a desktop PC too! ✓ Send and receive fax/modem available, so you can always stay in touch. And that's not all.

THE INTELLIGENCE OF THE 386SL CHIR

Intel designed the new 386SL processor specifically for notebooks. And they were right on target! You'll find that this sharp new processor extends your battery life significantly because it's intelligent enough to power-down the memory, disks, modem, and more when they're not in use. It's perfect for the stop-and-go computing that you're likely to do every day.

MANAGE YOUR POWER.

Or if you're working non-stop, you'll get even more out of the battery by using the programmable power management features. And here's another really neat benefit we know you'll love. You can change batteries without having to shut off the system! You can even use Suspend/Resume when you're working in Windows. Speaking of Windows...

FREE LOTUS SOFTWARE.

We don't just stop with great hardware. In packages 2 and 3 we're giving you—

absolutely free—your choice of two of the most popular Windows software applications on the market today. Choose from

Lotus 1-2-3 for Windows, Ami Pro and Freelance Graphics for Windows. And that's in addition to *Microsoft DOS 5.0 and Windows 3.1.* Complete and fully documented, these software packages alone are worth close to \$1000. They're yours—free—from ZEOS!

WE'RE HERE FOR YOU 24 HOURS A DAY.

Buying from ZEOS means you also receive our award-winning after-the-sale support and service: 24-Hour-a-Day Toll-Free Technical Support, 365 days a year. You also receive our 30-Day Absolute Satisfaction Money-Back Guarantee and One Year Limited Warranty.

You're going to be very satisfied.
We guarantee it!



Now. A color notebook that's one of the lightest yet! The new ZEOS Color Notebook packs it all in at only 6.7 lbs. —including the battery.

Purchase orders from Fortune 1000 companies, governments and institutions subject to approval. Leasing programs are available. All prices and specifications are subject to change without notice. Please call to confirm pricing, specifications and warranty details. All products and company names are trademarks or registered trademarks of their respective holders. © 1992, ZEOS International, Ltd., 530 5th Ave. NW, St. Paul, MN 55112 USA. ZEOS is a publicly traded company NASDAQ symbol: ZEOS. CNBI-PCM-920829

CIRCLE 038 ON READER SERVICE CARD





John C. Dvorak

The Bonehead vs. the Power User

I was debating on-line about the merits of OS/2, Windows, and DOS. It came down to the following comment from a Windows-loving friend of mine: *"To me, the most frustrating thing about OS/2 is its use as an integrating platform. I don't care about*

32-bit-enabled applications; just give me apps that use the Workplace Shell so I can start with one interface and stick with it. For all its flaws, that's a compelling advantage of Windows. These days, you can put together a complete suite of Windows applications. I wish that were true of OS/2 so I could give its interface a fair shake."

On the surface, the comment seems valid. It took me a few minutes to realize that the argument was specious. A crock.

First of all, PC users aren't idiots who need a consistent, brain-dead interface with no flexibility. Even the Macintosh fanatics dumped that idea when HyperCard was invented. Unbeknownst to the majority of PC users, the single Mac interface has essentially been rejected by the Mac users as too inflexible. While there is some leftover commonality from program to program in the world of the Mac, most of the programs have unique characteristics that no longer follow the stiff old formula.

The "one interface" concept was rejected because it doesn't work except for the simplest applications. Besides that, who among us can't remember a few unique commands for a program we use over and over? Are users so stupid that they get easily confused when switching from Lotus 1-2-3 to WordPerfect to the Telix communications program? "Drat, there I go again with that Backslash key. Why, oh why, can't I remember that upload is the PgUp key!" What kind of dopes are today's users?

I realize that plenty of

managers are out there saying, "You should see some of the boneheads who work for me! They need all the help they can get!" And I suppose a case can be made for a "suite of Windows applications" whose common bond is some sort of consistent and rigid interface. So let's bring the common denominator to the bonehead level. Great idea (not!).

Personally, I never thought I'd see the day when the PC community would be spouting the same crapola spewed out by the early adopters of the Mac back in 1984. This was the same nonsense that the PC community flatly rejected back then. Those were the days when it was okay to understand a little bit of DOS.

Let me summarize my feelings: Windows is, at best, a priggish, effeminate interface modeled after the sissified Macintosh operating system interface. Is that blunt enough? The Mac interface served one purpose: to ingratiate newcomers with an ease-of-use welcome mat. In other words, to sell computers to rubes.

Why such a thing would now be so praised,

fawned over, and worshiped by today's macho PC user baffles me. OS/2 is the obvious power-user operating system of choice. Yet the would-be power users spend their time crying and whining about how it has too many disks and needs too much memory. Moaning and groaning about how it won't run quickly on the old 386SX. What happened to the power users, anyway? When did they turn into a whimpering mass of Jell-O?

Maybe a cookie and a nap would help them.



PC users are not idiots who need a consistent, brain-dead interface with no flexibility.



Half of work is concentration,

To help bring your best ideas to life, Philips introduces brilliantly designed tools that provide the kind of performance you'd expect from a leader in innovation.

Brilliant Performance

Philips offers a full line of state-of-the-art products, most with multi-frequency capability, digital image control, and low emissions circuitry. Display resolutions run up to 1600x1280. And most models offer Philips' exclusive FastRefresh™ capability, which redraws the on-screen image up to 160 times per second* to reduce fatigue caused by image flicker. This level of display performance is for demanding professional applications like CAD/ CAM, advanced graphics, and document preparation.

Multi Compatibility

The Philips line is the perfect match for Intel based and Macintosh computers, as well as most workstations. Thanks to our advanced digital control autoscans technology, these monitors adapt to a wide range of high-resolution graphic controller cards supporting scan rates as high as 82kHz.

the other half is brilliant support.

The integrated front-panel LCD display provides information on product operation and sets a new standard for ease-of-use.

Complete Line of Full-Featured Monitors

Since one size never really fits all, Philips technology is available in 14", 15", 17", 20" and 21" screen sizes, with a model that's right for virtually every application.

Low Emission

Consistent with Philips' leadership position, our new monitors are equipped with VLF/ELF emission circuitry that meets or beats tough Swedish MPR-2 guidelines, and are built to perform for the long term, with 50,000 hour MTBF design reliability. Give your work the support it deserves - brilliant support from Philips.

* Actual refresh rate may be limited by video controller card or software.

Another First From Philips



PHILIPS

John C. Dvorak Inside Track

How does Intel keep ahead of the competition? **Parallel development**, that's how. So parallel that while we wait for the 586 (or P5, or whatever the company's going to call it), the 686 is already half designed. Look for the **686 to be in prototype** by the end of 1993. If the P5 delivers 100 MIPS, the P6 will deliver twice that or more.

If you haven't heard, the issue of Intel's naming convention has **everyone confused**. The company is so intent on being the sole owner of the part number for the 586 and 686 that it will drop the 586 and 686 monikers and go off with a new line of chip names such as the **boring** P5 or P6 sobriquet.

Intel's concerns aren't helped by **paranoia-inducing** moves by both IBM and Microsoft. IBM has been making noise about using the Cyrix 486 clone chip in some future notebook computer. Industry observers say this is just an attempt to **force Intel** to give IBM a concession to sell its clone chips on the open market. IBM has a license for making the Intel 386, but only for use in its own machines.

Meanwhile, Microsoft is showing off Windows NT on various RISC processors, thus **souring the relationship** between Microsoft and Intel. **Gates used to brag** about how the Intel designs were influenced by Microsoft. I guess those days are over.

Intel is fighting back on all fronts. It's pushing its brand name to the public with the "Intel Inside" campaign. Intel pays advertisers a fee if they use the **weird** little Intel Inside logo. Intel approves the location of the logo, **ruining** some artistically interesting ads. The elegant Dell ads, for example, are **made cheap-looking** by the addition of this logo. This whole alien logo within an ad sets a bad precedent for the industry. **Have you ever seen an Indy race car?** Can we expect that computers and ads for computers will eventually be covered with corporate logos, icons, and catch phrases?? Intel Inside. We Use Toshiba Memory! **Screws by Acme**. Teac Floppy Disk Drive—the Ones That Work When You Need Work. Conner Hard Disks—More Speed, Less Power Required. Word-Perfect Spoken Here! It looks like a messy future!

Modem Advice: If you haven't been following

*IBM is making noise
about using the Cyrix
486 chip in future
notebooks, and
Microsoft is showing off
Windows NT on
various RISC chips.
Intel is fighting back
on all fronts.*

the trends, then **you missed out** on the fact that the modem data transfer speed of choice is now 14.4 Kbps. Amazingly, it's available on modems costing less than \$400. This new breed of modems adhering to the V.32bis standard uses new inexpensive modem chip sets from Rockwell and others. The prices are expected to fall into the \$199 range within the next year or two. But why wait? 14.4 Kbps is so fast that you'll save enough money on long-distance charges to pay for the modem. The **bonus** is that the new modem chip sets include full-featured fax-modem capability.

Dallas Fax and Supra are two modem companies exploiting the price curve. The Supra 14.4 fax modem is the one I've been using recently, and I was stunned when the company sent its customers a free ROM upgrade. That's service.

My advice: It's time to jump on these inexpensive high-speed killer modems. Look to make sure the modem is V.32-, V.32bis-, V.42-, or V.42bis-compatible, and you should have a modem that does just about everything you need. As an aside, let me give my once-every-two-years **plug** for my telecommunications tome, **Dvorak's Guide to PC Telecommunications**. The **new** second edition is now shipping. It's 1,150 pages and costs \$39.95, including a disk full of software and a fully licensed copy of **Telx** (the communications program I use and prefer). **Demand a copy** from a bookstore today. There, I've said it!

Genuinely Interesting Catalog Dept: Here's one from a company calling itself Paper Direct that specializes in **something new:** laser-printer paper. Not just any laser-printer paper, mind you, but exotic stuff like the Shimizu line that appears to be handmade Japanese one-of-a-kind paper. It also sells a **strange foil** that you can put through your laser printer to create a foil-stamped letterhead. **Wild, wacky stuff.** Get the catalog and you won't regret it. Call 201-507-5488 or fax to 201-507-0817.

Exploiting the Brand-Name Dept.: Look for Tandy (a.k.a. Radio Shack) to **exploit** the brand name Memorex at long last by introducing a **hand-held pocket PC**. By this time next year, we'll see a slew of these things all using those PCMCIA cards for peripherals and mass storage. □

TRUST ME.

YOU HAVE MY

YOU'LL NEVER HAVE A PROBLEM
WITH THIS NETWORK.

WE TAKE FULL RESPONSIBILITY
FOR YOUR NETWORK.

BUY A NETWORK AND GET A FREE H

To sell you a network, a dealer will tell you just about anything you want to hear. But if there's a problem with your network, you'll often get nothing but the run-around.

With Dell, instead of getting the run-around, you'll get up and running in no time.

First, you'll be advised of the Novell® NetWare Lite™ network configuration that best suits your needs and helps you integrate your current PCs.

Next, your systems will come complete with network cards,

OPTIONAL EASYSTART SERVICE INCLUDES:

- Cabling Assistance
- Network Customization
- Integration of Current PCs and Peripherals
- Network Back-Up Procedures
- Network Management and Administration Procedures
- Network Security Practices
- Network Expansion Plan

operating systems, and selected MS-DOS® applications already installed. And now, if you're interested in our optional EasyStart consulting service, we'll begin by answering all your questions.

**NETWORK SUPPORT?
ANY TIME YOU NEED IT.**

WORD ON IT.

**WE'VE GOT A WHOLE TEAM
OF NETWORK EXPERTS.**

THIS IS A FOOL-PROOF NETWORK.

FROM A DEALER OF AIR BALLOON.

If you're having problems with your network cables, we'll arrange to have a local company do the cabling for you.

Then all you have to do is turn the system on and your Dell EasyStart consultant will be available to walk you through the entire start-up process by phone. The consultant answers your questions and works to ensure that your start-up is smooth and hassle-free.

To make sure you're totally satisfied, the Dell network that you buy and our EasyStart service come backed by a 30-day money-back guarantee and our legendary service and support.

So give us a call today. Because when you're trying to get your network off the ground, the last thing you need is a lot of hot air.

DELL™

800-531-2746

WHEN CALLING, PLEASE REFERENCE #118Y4.

HOURS: 7AM-9PM CT MON-FRI, 8AM-4PM CT SAT, 10AM-3PM CT SUN.
IN CANADA, CALL 800-668-3021. IN MEXICO CITY, 250-7111.

CIRCLE 029 ON READER SERVICE CARD

MANNESMANN TALLY®

A Mannesmann and Siemens Company

Can you help Spot spot the \$400 difference?



SCALABLE FONTS

This is CG Times 30Pt. Bold
This is CG Times 48Pt. Bold
This is CG Tim

This is Univers 30Pt. Bold
This is Univers 48Pt. Bold
This is Univers

MT908

SCALABLE FONTS

This is CG Times 30Pt. Bold
This is CG Times 48Pt. Bold
This is CG Tim

This is Univers 30Pt. Bold
This is Univers 48Pt. Bold
This is Univers

HP LaserJet III®

Okay, here's a hint. The market leading laser printer features HP® PCL5 printer control language. The MT908 laser printer from Mannesmann Tally is PCL5 compatible, as well. Oops. The market leader provides 8 scalable fonts. The MT908 gives you the same scalable fonts. Hmm. The market leader offers a feature for smoother edges on fonts and graphics. The MT908 has Edge Enhanced Technology (EET®) for the same effect.

Alright. What about performance? The market leader prints at 8 pages per minute and includes the processing power of the Motorola 68000. The MT908 prints at 8 pages per minute but provides 2.5 times faster processing of scaled fonts and graphics with its Intel i80960 RISC pro-

cessor. Now we're getting somewhere.

The market leader comes with a 250 sheet capacity letter-size cassette. If you want to load legal paper, envelopes etc., you'll have to buy additional cassettes. For more convenient paper handling, the universal paper cassette of the MT908 adjusts to hold 250 sheets of letter, legal and international sizes or up to 30 envelopes. And, there is an optional 300 sheet second paper bin that mounts under the MT908 ... you can't even buy that from the market leader.

Bottom line: the Mannesmann Tally MT908 gives you all the features of the market leader with faster processing for



MT908 Laser Printer

faster throughput, better paper handling and has a list price of only \$1,995... \$400 less than the market leader*.

You can even add built-in PostScript® language compatibility.

So any way you figure, the answer comes up the same. The MT908 looks better, and so does the price.

For the name of your nearest dealer, call:

1-800-843-1347 Ext: 472

Mannesmann Tally Corporation
Kent, Washington

A mannesmann technology company

*Based on HP LaserJet III suggested list price of \$2,395
HP and LaserJet III are registered trademarks of Hewlett-Packard Corporation.
EET is a registered trademark of Destiny Technology Corporation.
CG Times and Univers are trademarks of AGFA Compugraphic Corporation.

A Dalmatian symbol may be a Hewlett Packard
PostScript is a registered trademark of Adobe Systems, Inc.

CIRCLE 056 ON READER SERVICE CARD



Jim Seymour

A Trackball in Every Notebook

Apple PowerBooks got it started, of course. Now it's spreading like wildfire. And by this winter, most serious new notebook PCs will incorporate built-in pointing devices. Think I'm exaggerating? Just wait for the reports from Fall Comdex.

The trackball-in-the-corner-of-the-keyboard phenomenon makes so much sense for portable PCs running Windows that it's surprising, in a sense, that it's taken this long—more than two years after the epochal Win 3.0 shipped—for the idea to jell.

Commit to a GUI environment, and you've committed to a pointing device.

And just a little time traveling with a Windows-equipped portable teaches you how much you need an *integral* pointing device.

I really like Microsoft's BallPoint Mouse and Logitech's TrackMan Portable. Both are well-made devices, and both work. But having to get out the mouse, screw its clamp onto the machine, run the mouse cable around to the back of the PC and plug it in—all before you can go to work—is ridiculous.

And of course you get to reverse that routine every time you put the machine away.

Though I've grown used to reaching over with my right hand to cup the BallPoint in my palm so I can issue a click or scoot something around, it's hardly an ergonomic move—nor, after you've used a built-in trackball, a very smart one.

I couldn't begin to list all the notebook PCs I've seen lately with built-in trackballs. Some, like the Compaq LTE Lite/25c, CompuAdd 325tfx and 325tx, and Sharp PC-6881, are already on the market. Many more are on their way—late 386SXs, 386SLs, and a small flood of 486SXs. To put it simply, new notebooks will need a built-in pointing device to be taken seriously.

And trackballs are the best approach I've seen, from GRiD's IsoPoint roller to wiggly keytops.

Working with several of the early built-in-trackball machines has taught me a few things that you may want to keep in mind as you evaluate this new crop. Pay attention to the trackball's size, its placement, and how it moves the cursor on-screen.

I use Kensington Expert Mouse trackballs on the desktop, so I'll admit I'm spoiled by cue ball-size trackballs. And the PowerBook's relatively large trackball is the best portable version of the idea I've seen yet. But even the small rolling balls in most of the notebooks I've handled have been acceptable.

There's no substitute for a large-diameter trackball, but small ones work well if they're positioned correctly and if they have the right rotational tension and the right mouse-driver software.

Positioning isn't self-evident at all, and turns out to be a lot more important than I'd thought. Logic seems to suggest that you want the trackball at the front edge of the keyboard, to your right (sorry, left-ies). But I find the built-in trackballs mounted at the back of the keyboard, to the right, more convenient.

Yes, it's a longer move to slide my hand that far; but it also *feels* better. And that position lends itself to easier button clicking.

CompuAdd's 325tfx and 325tx, clearly made by different OEMs, illustrate this paradox. The more expensive 325tfx mounts the trackball in that nice, logical right-front position; the 325tx puts the trackball above

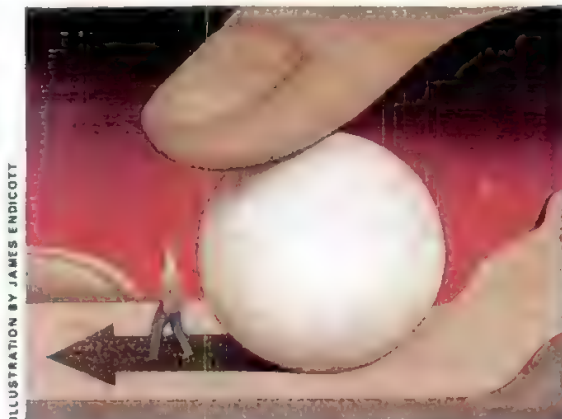


ILLUSTRATION BY JAMES ENDICOTT

This fall's bumper crop of trackball-equipped PCs will make it easy to take your GUI on the road.

SQUEEGEE™ MAKES WORKING IN WINDOWS EASIER.

Navigate less. Get more done faster. Pick up the professional tool for Windows.™ Squeegie immediately boosts productivity, bypassing the program manager to launch files and applications from menus. To make things even less time-consuming, you can launch sets of applications and files for specific jobs with a single mouse click.



Take a new route to greater productivity gains.

Squeegie lets you work the way you want to rather than the way Windows was designed to make you work. For example, you can run, edit, copy, move, delete, and rename files from a single dialog box within any application. You'll define default directories and assign any file to multiple applications with ease. View a history of recently navigated directories or search files by name, extension, date, size, contents, or any combination. Find what you need then launch it with a single click or keystroke.

Squeegie installs automatically and updates menus whenever you add a file or application.

All signs point to Squeegie. How's about a copy of your own? We'll arrange it.

Call us today at 1-800-877-4266.



DON'T DO WINDOWS WITHOUT IT.

ICOM
ICOM SIMULATIONS, INC.

©1992 ICOM Simulations, Inc. 648 S. Wheeling Rd. Wheeling, IL 60090. All Rights Reserved. Squeegie is a trademark of ICOM Simulations, Inc. All other trademarks are property of their respective owners.

SYSTEM REQUIREMENTS: If you're running Windows, you can run Squeegie.

CIRCLE 044 ON READER SERVICE CARD

Jim Seymour

the keyboard, also to the right.

The big difference is in clicking to select something, once you've pointed at it.

On the tfx, you roll the small ball around with your right thumb and use your left hand to push the equivalent of two mouse buttons, labeled M1 and M2, located at the far-left edge of the keyboard. On the tx, you manipulate its truly tiny ball with your right thumb, then slide that same thumb an inch to the right to click on either of two mouse buttons at the edge of the computer (marked, curiously, Enter and Select).

In other words, on the tx, mousing around is still a logical, well-coordinated one-hand activity. But on the tfx, you have to learn two-handed mousing, which is not only inconvenient, but illogical and uncoordinated for anyone who's used a conventional mouse or trackball.

Despite its too-small ball, the tx's one-handed answer is a much better way to work. I eventually got used to the tfx's weird two-handed approach—a bit like patting the top of your head with one hand while moving the palm of your other in circles on your stomach—but I never got to the point where I liked it.

Moral: Don't accept as logical and thus preferable something you haven't actually tried yourself for a while.

Built-in trackballs are usually software-compatible with the standard Microsoft Mouse. This is a good thing. You'll undoubtedly use Windows' Control Panel slider to set your built-in trackball for very fast Mouse Tracking Speed. That'll help you move the cursor large distances across the screen with relatively small movements of the trackball.

But because fitting a trackball and its buttons into the keyboard's crowded layout means the ball is going to be small, the trackball also demands ballistic-control software for cursor movements.

That is, the cursor should travel farther the faster you move the ball. For now, the Compaq LTE Lite/25c and CompuAdd 325tx offer the best built-in trackballs I've seen in a DOS machine. Watch for that flood of trackball-equipped notebooks this fall and winter; this is an idea whose time has come. □

Protects while you type!

Merritt
COMPUTER PRODUCTS

SafeSkin
KEYBOARD PROTECTOR

SafeSkin is not just a dust cover. It is custom molded for specific keyboards. The pliable film is contoured to hug each key...to fit like a second skin. As you type, adjacent keys are unaffected and tactile response is maintained.

SafeSkin is made from high-tech polymer film. It resists most chemicals and is easily

cleaned...even sterilized. Its surface is treated with a special non-glare finish for easy readability in all lighting environments. SafeSkin installs in a breeze. Just settle it on your keyboard and its adhesive strips hold it securely in place. It wraps under the keyboard for extra protection. More than 800 models available.

ELEK-TEK
ComputerLand
EXPRESS

BIZMART
Computers • Software • Office Products

TECHHEADS SOFTWARE

COMPUTER *Direct*

WHOLE EARTH ACCESS

Merritt Computer Products, Inc. • 5545 Red Bird Center Dr., Suite 150 • Dallas, Texas 75237 • (214) 339-0753 or FAX (214) 339-1313

CIRCLE 135 ON READER SERVICE CARD

A Brand New Accounting Package That's Already Been Tested 498,000 Times.

New Peachtree Complete Accounting, Version 6.0.

We've just re-invented the most popular accounting software in history.

The software that's already proven itself on the desks of half a million small businesses. The software more than twice as many accountants recommend to their clients. Peachtree Complete.



When you've got hundreds of thousands of people using your product, every day, they're bound to come up with some good ideas.

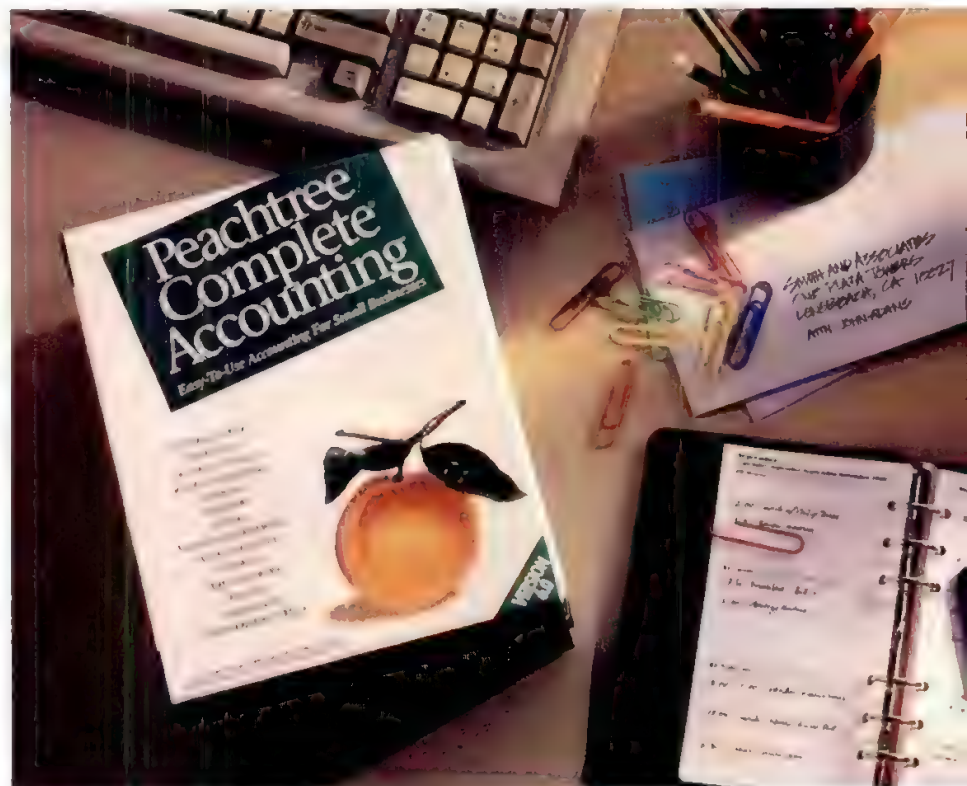
We've taken those suggestions and turned them into the best accounting package ever.

More Options. More Flexibility.

Peachtree Complete Accounting, Version 6.0 is the most feature-packed software you can buy. It includes General Ledger, Budgeting, Accounts Payable, Accounts Receivable, Invoicing, Payroll, Inventory, Purchase Orders, Job Cost, Fixed Assets, and Management Reporting.

Version 6.0 also includes customizable invoice formats, with separate formats for product and service businesses. Plus, we've added a Quick Start Guide to get you up and running quickly.

That's one of the nicest things about Peachtree Complete. It's easy to get started. Begin with just the modules you need, and add the others as your business grows.



More Value-Packed Than Ever.

Peachtree Complete sells for just \$249. A real bargain, when you consider all it can do for your business. Plus, it now includes Peachtree Data Query, our custom report writer (a \$199 value), at no extra charge.

A multi-user version of Peachtree Complete is also available. Call for details.

Only Peachtree Gives You This Kind Of Support.

Our nationwide network of support centers is unrivaled in the industry. After

all, we've been supporting small business longer than anyone else. And our 60-day money-back guarantee is simple: you don't love the software, you don't pay for it. Simply return it for a full refund.

So visit your local dealer today or call PeachLine at (800) 428-9973, and put the experience of half a million small businesses on your desktop.



Peachtree®
The first name in small business accounting software.™



PEACHLINE — The improvements we've made to new Peachtree Complete Accounting, Version 6.0 are so numerous, we could never list them all here. If you'd like full details on our complete line of products, or you'd like to place an order, call our accounting specialists at (800) 428-9973.

©1992, Peachtree Software, Inc., Norcross, GA • All products are trademarks of their respective companies.

CIRCLE 358 ON READER SERVICE CARD



Your upgrade

Introducing Intel OverDrive™ Processors.

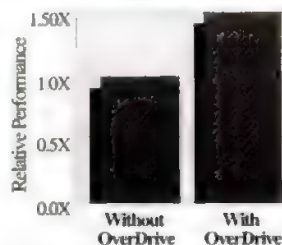
With built-in upgradability we promised you room for the future. Room for more power.

Well, the future has arrived. Presenting a revolutionary new

category of single-chip upgrades: Intel OverDrive Processors.

The easiest, most cost-effective way to add even more power to your system—for Intel486™ SX PCs

Intel486™ SX-20 System
Performance: Microsoft
Word for Windows*



now, and soon for all 486 systems and beyond.

Just pop in a new OverDrive Processor and you'll improve overall i486 SX system



just checked in.

performance by up to 70 percent. Added performance that will benefit over 50,000 compatible software applications.

And that goes for today's demanding Windows software, too.



In fact, by adding an Intel OverDrive Processor, your 486 PC will even run multiple Windows applications faster.

To check in to the OverDrive Processor, see your local computer dealer now.

Or for a detailed brochure, call 1-800-538-3373, ext. 93. And hurry. The vacancies are filling fast.

intel.

LETHAL WEAPONS.

This is a warning. We're about to hit you right between the eyes. Don't duck, read on. It's a competitive world out there for you and for us. That's why we want to make a direct hit and give you the upper hand with a top notch weapon that is loaded with industry firsts.

In choosing EPS, you're making a smart decision. EPS was the *first* to offer a 1 Meg SVGA card. EPS was also the *first* to offer 32,000 colors and *first* to come out with a 14" Non-Interlaced monitor, all standard. We're also the *first* to take your money back guarantee from 30 to 60 days!

That's some pretty hefty ammo and we offer much more.

Of course, now WINDOWS is the rage and we've got what it takes to enhance it. The EPS 15" DIGITAL color, high resolution monitor with push button DIGITAL controls and the ATI Ultra Graphics Card will take your WINDOWS and CAD packages to ultimate heights.

All along we've been setting industry standards

which allows us to give you the best now. So

why wait for the others to catch up or buy a machine that will require an immediate upgrade?

With EPS you get superior component quality, outstanding service and support, plus an over all better value that is priced right.



386 33MHZ & 40MHZ \$1595
486SX 25MHZ \$1645
486 33MHZ \$1945
486 50MHZ DX2 \$2095

- ▶ 14" EPS 1024NI Color SVGA Monitor
- ▶ 65.768 Color SVGA 1MB Card (w/Accelerated WINDOWS drivers)
- ▶ 128K 20ns Static RAM Cache
- ▶ 4 Meg 70ns SIMM RAM
- ▶ TEAC 1.2MB & 1.44MB Drives
- ▶ Maxtor 130 Meg 15ms IDE Cache Drive (150,000 Hour MTBF)
- ▶ 101 Enhanced Keyboard
- ▶ Baby Desktop Case w/6 Drive Bays
- ▶ MS WINDOWS 3.1
- ▶ MS DOS 5.0
- ▶ 3 Button 1600 DPI Mouse
- ▶ System User Manual
- ▶ 60 Day Money Back Guarantee
- ▶ On-Site Service
- ▶ Customizing Options Available

486SX 25 Standard 64K Cache

486 33MHZ \$2395
486 50MHZ DX2 \$2595
486 33MHZ EISA \$3095
486 50MHZ DX2 EISA \$3295

- ▶ 15" EPS Digital Microprocessor Monitor 1280 x 1024 res 72Hz Refresh
- ▶ ATI Graphics Ultra SVGA Card (w/1 Meg VRAM, 512K DRAM)
- ▶ 256K 20ns Static RAM Cache
- ▶ 4 Meg 70ns SIMM RAM
- ▶ TEAC 1.2MB & 1.44MB Drives
- ▶ Maxtor 213 Meg 15ms IDE Cache Drive (150,000 Hour MTBF)
- ▶ 101 Enhanced Keyboard
- ▶ Tower Case w/8 Drive Bays
- ▶ MS WINDOWS 3.1
- ▶ MS DOS 5.0
- ▶ 3 Button 1600 DPI Mouse
- ▶ System User Manual
- ▶ 60 Day Money Back Guarantee
- ▶ On-Site Service
- ▶ Customizing Options Available

EISA Systems Standard w/128K Cache and 32 Bit IDE Controller

We're not only loaded with industry firsts but offer delivery times you can count on. It's a shot in the right direction. And we've cut our ads to the bare facts. We don't think your money should help pay for fancy ten page

spreads. At EPS we'd rather put it into research and development to assure the quality and compatibility you've come to expect from EPS Technologies. Need more ammo? Read our reviews. You'll see why we're right on target.

EPS Technologies, Inc. 10069 Dakota Avenue
 P.O. Box 278 Jefferson, SD 57038
 Hours: 7am-7pm M-F, 9am-3pm Sat CST

EPS Technologies
"a tradition of value and performance"

1-800-447-0921
ORDER TODAY TOLL FREE

FAX Orders 1-605-966-5482 ☎ Direct Line 1-605-966-5586 ☎ Tech Hot Line 1-800-526-4258
GSA Contacts #GSOOK91AGS5035-OPT1

All brands and product names mentioned are trademarks of their respective holders. Prices are subject to change due to the volatility of the market. 80386 and 80486 are trademarks of INTEL.

CIRCLE 284 ON READER SERVICE CARD



William F. Zachmann

Nothing In, Nothing Out

GIGO, “garbage in, garbage out,” was already a watchword of systems analysis in the 1960s. Now meet NINO: nothing in, nothing out. Anyone who builds industrial-strength applications on microcomputers in the 1990s should know both terms.

Those who attempt to build an information system without knowing GIGO and NINO are bound to fall prey to what I call the “shrink-wrap fallacy”: the assumption that serious, large-scale applications can be developed without requisite IS experience.

GIGO seems simple enough. Even a novice user of a basic spreadsheet program knows that if the data you enter isn’t accurate and reliable, the information you get out won’t be accurate and reliable.

NINO is an even simpler principle. You cannot get information based on certain data if you don’t put that data into your system in the first place.

Simple and obvious as GIGO and NINO may look at first, exactly how to avoid them is not. Underestimate their potential for harm, and they will rob your systems of effectiveness and flexibility.

All applications require some sort of structured collection of data. Whether it is as simple as an array of cells in a spreadsheet or as complex as a distributed, fully normalized, relational database spread over multiple servers, *some* data structure must exist for an application to be possible.

When applications are straightforward, the amount of data is small, and the data structure is uncomplicated, GIGO and NINO are seldom a problem. But they become dangerous when apps get complex, the collection of data grows large, and the data structure is convoluted.

GIGO is somewhat easier to deal with than NINO. Still, much must be done. Each data item needs to be scrutinized on input to be sure it’s ac-

curate and consistent, it conforms to established code tables or descriptions, it matches valid account numbers, and so forth.

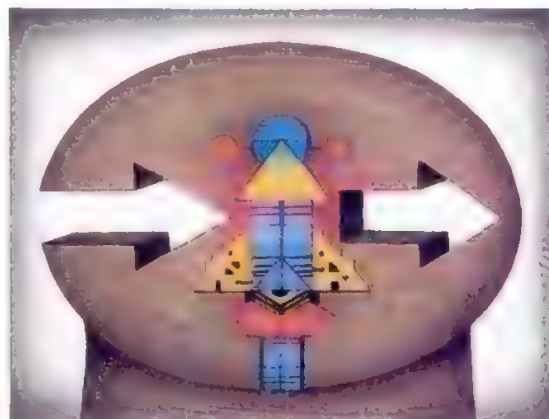
Audit trails, rollback and recovery procedures, account sum validations, cross-footed totals, and similar measures must be built into the system to ensure data integrity. IS professionals know these and other measures to avoid GIGO.

NINO poses more difficult problems, because the “nothings” in NINO involve both the application’s data content and structure. If that structure does not provide a place for data—or provides a place in which that data doesn’t fit adequately—nothing will get in.

Consider an aircraft maintenance application, where repairs on hydraulics, engines, and various other systems and subsystems must be tracked. Maintenance has to be regularly scheduled on the subsystems and components, and also on critical, serial-numbered parts. Work orders and repair reports must be maintained for the life of each aircraft.

Regular outputs required include detailed repair histories and mean time between failure reports by aircraft, system, subsystem and component, and half a dozen other reports, too.

It is crucial that this application be built to ensure a place for data from many sources. That’s as true for LAN server- and PC workstation-based applications as it is for apps built on mainframes. Avoiding GIGO and NINO is not a job for amateurs. It requires pros. □



Don't expect to get dependable data out of your apps if you don't build in a place for the right information.

It's perfect for executives

The Librex R386SL is an easy decision for even the most indecisive. Because it's so adaptable,

you can change it as quickly as you change your mind.  You can easily upgrade the

standard screen (*32 shades of grey*) to VGA color with just a snap. (*Makes even the dullest data*

look interesting.)  It offers a removable 80 or 120MB hard disk drive, so you can build a library

of files and keep data secure. (*More storage than the biggest of file cabinets.*)  The inte-

grated track-ball mouse can be easily snapped over for left-hand use. (*Sort of like equal rights*

for southpaws.)  And you can replace the floppy drive with the auxiliary "extra-life"

battery pack to increase operating time from three to up to eight continuous hours. (*Which*

means you won't have to watch those lousy in-flight movies ever again.)  For more info,

or to find out how to get a \$100 credit for Librex options, call 1-800-248-4880, Dept. R1.

Battery life:
Up to 8 hours with
auxiliary "extra-life" battery.

Display:
9.5" Monochrome LCD.
Upgradeable to color.

Size/weight:
8.5" x 11.6" x 1.9"
6.5 lbs with one battery.

CPU:
i386SL, 25MHz

who can't make decisions.



Memory: 4-20 MB.
Storage: 80 or 120 MB
removable hard drive.

Integrated mouse:
Detachable for right and
left-hand users.

Options:
Internal Fax/Modem.

LibrexTM
The Freedom Of One.



**The Kyocera
ECOSYS a-Si Printer
can save you
endless
numbers of these ...**



But just one of these.

**The promise of non-cartridge technology.
The costs are too high for anything else.**

It's the promise that took the total resources of a worldwide corporation to fulfill: Kyocera.

And only Kyocera's dedication to preserving Earth's precious environment could have resulted in the ECOSYS amorphous silicon printer. A printer with so radical a design ... it totally eliminates the need for the mountains of laser cartridges that conventional printers spew out, every year.

What a saving for the living world!

High operating costs are now a thing of the past, too.

ECOSYS simply offers the lowest cost per page of any desktop printer ever introduced: 0.78¢ for ECOSYS vs. 3.1¢ for laser cartridge printers. A cost that's so low, the savings could add up to the entire price of a new printer in just a few years for a desktop user, less than one year for a network user.

What a benefit for the business world!

*All trademarks referenced are trademarks or registered trademarks of their respective companies.
**Warranty covers 1 year or 300,000 pages, whichever comes first, on the entire system. 3 years or 300,000 pages, whichever comes first, on the imaging system including aSi drum surface and LED print head. See warranty for details.





Winner

ECOSYS also offers an unprecedented range of optional paper handling features such as two additional 500-sheet paper drawers, duplexing unit, 15-bin sorter/stacker, even a power envelope feeder. Optional compatibility and networking features include KPD, Kyocera's PostScript compatible interpreter, plus plug-in Token Ring, Ethernet and AppleTalk solutions.*

This printer not only backs you with lifetime toll-free support, it also supports you with an imaging system warranty** as far-reaching as ECOSYS, itself.

For the working environment ... for the living environment ... the ECOSYS a-Si Printer is the first page printer ... for life.

Call: 800-2-ECOSYS
(800-232-6797)



ECOSYS
a-Si PRINTER™

*Saving the Earth
is the best investment
you can make.*

KYOCERA ELECTRONICS, INC., 100 Randolph Road, Somerset NJ 08875

CIRCLE 370 ON READER SERVICE CARD

Move up to the power and value of an Everex STEP MP.



The STEP™ MP from Everex™ is a major advancement in computer technology that delivers minicomputer performance at client server prices* for SCO® UNIX applications.



The STEP MP's scalable architecture guarantees outstanding system performance.

Designing the ideal UNIX server solution can be accomplished with the scalable addition of microprocessors — from 1 to 6 i486™ 33MHz CPU's,

accommodating more than 120 users! The STEP MP's open architecture allows customers to use industry standard peripherals, operating systems and thousands of applications.

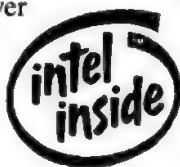
The STEP MP's performance in benchmark studies is outstanding. In fact, against the competition, no other alternative matches the STEP MP.

Every STEP MP Authorized Reseller is trained to install, repair and support your high performance system. Same-day on-site support can be made available

as well by your Everex reseller.

If you're looking to move up to the best value in high performance multi-processing SCO UNIX systems, call us today. We can help make your business better. Today and in the future.

CALL TODAY
1-800-272-2332
EXT. 33007
In Canada (800-661-2003)

*Base systems start at \$10,999. International Operations: Benelux 31.73.408.308; Canada: 416.829.3637; France: 33.1.69.07.60.41; Germany: 49.69.69.50040; Hong Kong: 852.369.2828; Spain: 34.1.630.9212; United Kingdom: 44.81.205.0607. ©1992 Everex Systems, Inc. EVER for EXcellence is a registered trademark, and Everex STEP is a trademark of Everex Systems. i486 and the Intel Inside logo are trademarks of Intel Corporation. Other brand and product names are trademarks or registered trademarks of their respective companies.

WINDOWS DESKTOP MANAGERS

Everybody's got their own idea about how Windows should look and work. Those who use it "out of the box" find plenty of ways—personalized program groups, hotkeys to move between favorite applications, and the like—to adapt Windows' desktop environment to their own de-

20 Ways to Remodel Your Desktop

Run Windows the way you want to with one of these customizable file, task, and/or program managers.

IN THIS REVIEW

<i>Amish Utilities for Windows</i>	115
<i>AttiTools</i>	117
<i>BackDesk</i>	117
<i>BeckerTools</i>	124
<i>Direct Access Windows</i>	126
<i>File Commander</i>	126
<i>hDC Power Launcher</i>	128
<i>HotWin</i>	138
<i>K-U-I</i>	141
<i>METZ Task Manager</i>	141
<i>NewWave</i>	147
<i>The Norton Desktop for Windows</i>	149
<i>Ready, Aim, FILE! for Windows</i>	153
<i>Salvation</i>	154
<i>Sloop Manager</i>	155
<i>SmartPad for Windows</i>	158
<i>Squeegee</i>	158
<i>Synergy</i>	161
<i>WinEZ Pro</i>	168
<i>WinTools</i>	168
Summary of Features	140

PHOTOGRAPH BY RALPH NASSI/ILIC

by Rock Miller

THE NORTON DESKTOP FOR WINDOWS

hDC POWER LAUNCHER

WINTOOLS



Windows Desktop Managers

Suitability to Task:**Windows Desktop Managers**

Windows desktop managers should make Windows work the way you do, offering functionality Windows lacks but you need. We rate the ability of 20 Windows desktops in providing the most commonly requested extensions to Windows functionality: customizing the desktop, managing files, automating work flow, and controlling the environment. In each category, we consider both the appearance of the desktop and the efficiency it affords.

Customizing desktop reflects how easily a user can create program groups, create and substitute icons, and create and launch macros from those icons. We also rate how easily a user can modify menus by adding and deleting choices, and we look at the ease with which work projects can be created by grouping files and applications together.

Managing files is an assessment of the features that allow users to view and manipulate files, directories, and disks. We look at launching capabilities, grouping capabilities, file linking, and

SUITABILITY TO TASK				
Product Name				
	POOR	FAIR	GOOD	EXCELLEN
Customizing desktop	●	○	○	○
Managing files	●	●	○	○
Automating work flow	●	●	●	○
Controlling environment	●	●	●	●
Controlling environment	N/A			

N/A— Not applicable. The product does not perform this task

the viewing of file contents. We also consider a program's ability to find, tag, copy, and move files and directories.

The programs that have a solid rating for **automating work flow** take full advantage of Windows' drag-and-drop and offer powerful script, batch, or macro languages.

Controlling environment is an indication of how easy it is to set up the program and how long it takes to become proficient at using the software. In order to receive any points in this category, a package must at least have completely automated installation. We also rate each Windows desktop manager's uninstall program (if present) and consider factors such as object management, linking, and virtual desktops.

signs. But alternatives abound for the many who want more—or less—than Program Manager and File Manager provide.

In this review, we look at 20 products that customize and streamline your Windows desktop. They help you launch programs, manage files, organize and automate your work flow, and alter the appearance of your workspace. In the interest of timeliness, we have included only products that have been upgraded since June 1991 and were shipping by May 1992. This ruled out at least two popular entries from the past, Wilson

WindowWare's Command Post and hDC Windows Express, plus some upcoming products, such as PC-Kwik Corp.'s WinMaster and Hewlett-Packard's Dashboard, which were not ready in time for our testing (see the sidebar "The Cabage Patch").

As befits the highly individual preferences of users, Windows desktops come in a bewildering variety of forms. Some packages aim to replace the basic Windows desktop metaphor with their own, presumably better one. Others, with more modesty, merely seek to enhance and extend Windows' own program and file management tools, which, while much improved in Windows 3.1, remain distinct entities with limited customizability.

SEARCHING FOR OBJECTIVITY

As long as it is operating on top of DOS (and thus subject to DOS's limitations), the Windows interface will never work as smoothly and transparently as the Apple

Macintosh's. Still, the more elaborate desktops in our group let you reap some of the benefits of the latter's so-called object-oriented concepts.

In The Norton Desktop for Windows (NDW), for instance, clicking open a drive icon on your desktop gives you a thoroughly recognizable directory-tree file manager from which you can either drag files to the appropriate icons for launching, printing, backup, or deletion, or operate on files using conventional menu commands and buttons. WinTools (formerly Aporia) goes further, attempting to implement just about everything as drag-and-drop operations. For those who are really out on the cutting edge, there is Hewlett-Packard Co.'s NewWave, which organizes your work as a series of projects and objects rather than as a system of files and applications. This program's power and complexity put it in a class by itself.

SILENT MAJORITY

Object-oriented program structure is a quasi-religious issue for many enthusiasts; in their zeal, they don't mind learning radically new concepts, procedures, and approaches to PC-based computing. Those who are not object aficionados, however, may find such solutions alien, hard to remember, and ultimately counterproductive. Fortunately, they have a wide choice of less radical options that let them work within, rather than work around, the Windows environment. The most ambitious of these is hDC Power Launcher, whose customizable "power bar" gives you quick access to a variety of file and workspace management tasks. WinEZ Pro, Sloop Manager, and Squeegie, while not command-shell replacements, significantly augment—or effectively replace—Windows' Program Manager (which isn't much more than a pretty menu system). BeckerTools and AttiTools' Catalyst module offer alternatives to Windows' File Manager (which even in Version 3.1 doesn't reach beyond the level of the average DOS shell). Salvation combines the functions of both Program Manager and File Manager in a single screen.

Our Contributors: EDWARD MENDELSON and BARRY SIMON are contributing editors to *PC Magazine*. LENNY BAILES is a California-based free-lance writer and frequent contributor to *PC Magazine*. ROCK MILLER is a frequent contributor to *PC Magazine*.



Windows Desktop Managers

Generally speaking, the programs mentioned above offer relatively elaborate desktop solutions. If simplicity is more your style, a minimalist shell that relies on pop-up menus and customizable hotkeys to speed access to a subset of your most common tasks may do a better job for you. You've got plenty of choices in this vein, from METZ Software's enhanced METZ Task Manager (which adds flexible program-launch capabilities and basic file management to that little box you pop up with Ctrl-Esc) to conventional text menu systems (such as Direct Access Windows and Ready, Aim, FILE! for Windows) to programs with elegantly streamlined pop-up menus, such as HotWin.

Many of the desktops (both simple and complex) let you assign hotkeys for quick access to your programs. One, K-U-I, is a specialist in this niche that provides the full power of a mouse (and a lot of speed) without an actual pointing device.

HotWin, too, offers almost

total control of the desktop with a few keystrokes. For rapid access to running programs, Amish Utilities for Windows, HotWin, BackDesk, WinTools, and hDC Power Launcher offer so-called virtual desktop capabilities (see the sidebar "Navigating the Windows Workspace with Virtual Desktops").

SHELL GAMES

Many of the programs in our roundup can replace Program Manager as your *Windows command shell* (Windows-speak for the program that begins and ends your Windows session; you set it up in the SHELL= statement found in your SYSTEM.INI file). It is generally a good idea to do this: You will save some memory, and you can always get to Program Manager, if need be, by launching it as an ordinary application. You will also conserve *system resources* (the special 64K memory areas Windows uses to keep track of its open windows and other elements). Program Manager uses up 15 per-

cent of your resources off the top; more elaborate environments tend to use somewhat more, while minimalist alternatives use much less. Though Windows 3.1's total resource pool is double that of Version 3.0, the pool is still finite; if you regularly run many applications at once, it is possible to run out of resources, even with plenty of working memory. Incidentally, as an added bonus, many of these desktops display your system-resource usage so you can monitor it at a glance.



▶ EDITORS' CHOICE

- **hDC Power Launcher**
- **HotWin**
- **METZ Task Manager**
- **The Norton Desktop for Windows**

Let's face it: Some people want a Swiss Army knife; others simply want one very sharp blade. The Norton Desktop for Windows, Version 2.0, and hDC Power Launcher, Version 2.0, are two powerful, full-featured do-it-all programs. They stand head and shoulders

above the rest—if what you want is a Swiss Army knife.

If you count yourself among the less-can-be-more crowd, then look carefully at HotWin, Version 2.0a, and METZ Task Manager, Version 2.0. These two packages combine power and elegance while remaining easy to install and use. Pick one of these if you want a single very sharp blade.

SWISS ARMY KNIFE

The Norton Desktop for Windows (NDW) is one of the few truly unified program/file manager replacement options. Not only does it deliver the best set of desktop management functions you

can buy today, but it also provides customization tools rivaled only by those of WinTools and extra utilities rivaled by none. Finally, NDW, Version 2.0, performs its many wondrous feats without imposing the performance penalties that characterized Version 1.0.

hDC Power Launcher may be the single most powerful product in this review (with the possible exception of NewWave). It has an especially powerful scripting language, complete with a command builder, and a highly customizable floating toolbar, to which scripts can be attached easily. Power Launcher's power should please those who are willing to tame it.

SHARP BLADE

HotWin is the sharpest blade, primarily if you want a keyboard-oriented program that admirably balances simplicity, flexibility, and power.

METZ Task Manager, an elegantly remodeled Windows task manager, offers so much of the functionality of Windows' Program Manager and File Manager in such an easy-to-use package that you may never return to the Windows counterparts.

HONOR AMONG THE REST

Three products deserve honorable mention. K-U-I, Version 1.0, should be your choice if you are a keyboard purist. It should appeal to those who want to run Windows on a laptop—without a mouse. WinTools, Version 1.0a, is the best of the object-oriented desktop programs if you are judging on the basis of ease of use. Finally, Synergy, Version 1.0, deserves a wave of approval for its innovative extras (such as Picasso), its icon manager and editor, and Psychic, its perpetual filename log. These ideas are the germs for the next generation of Windows desktops.

When you're ready to invest in more screen real estate, we have a whole neighborhood to show you.



Are your monitor needs a little too panoramic for your current screen size? When it's time to upgrade to 17" monitors for CAD, DTP, Windows or GUI applications, choose the Toshiba OmniSync™ monitor that precisely matches your needs. Because OmniSync monitors are truly multiple-frequency displays, they're compatible with the graphics standards of today. And of tomorrow.

Model Number	Dot Pitch	Resolution	Applications
OmniSync CS	0.26	VGA through 1280 x 1024	CAD/CAM
OmniSync CM	0.31	VGA through 1280 x 1024	Desktop Publishing/ Multimedia
OmniSync CU	0.31	VGA through 1024 x 768	Windows/ Business Productivity

AutoCAD image courtesy of Autodesk, Inc.

Every monitor in the OmniSync family — including our new 21" monitor — features Toshiba's own Flat Square CRT technology for a full screen display with reduced glare and reduced image distortion.

We've used Dynamic Astigmatism Control (DAC) for the best screen corner focus available, and dual parabolic voltage circuitry (PbVC) to minimize beam dispersion and enhance overall focus. A user pincushion control prevents image bending at the screen edges.

MiniDB-15 or BNC connectors are switch-selectable. And nine preset and nine user-defined image mode settings correctly size and position images — with any graphics card. All frequently used controls are on the front panel for ease of use.

All Toshiba OmniSync monitors are designed for low electric field and low magnetic field radiation emission levels. Unique, modular glass-epoxy circuit boards provide easy serviceability and long life.

Call (800) 253-5429, ext. 321, to find out how you can get more room. With a view.

In Touch with Tomorrow
TOSHIBA

TOSHIBA AMERICA C.P., INC. • Computer Display Group
1010 Johnson Drive, Buffalo Grove, Illinois 60089-6900

Windows Desktop Managers

FAMILIAR WORK PARADIGMS

A number of Windows desktops make it easier to organize and think about your work, letting you move away from the lock-step, application-and-file PC mind-set toward a more natural mind-set of projects and tasks. An "Annual Budget" task, for example, might require the use of your spreadsheet, a text editor, and all the relevant worksheet, report, and note files. A desktop that presents all of these elements, open and ready to go, will appeal to many as a logical and effective way to set up work under Windows.

There are numerous variations: Tasks may be set up as icons, as in NDW, METZ Task Manager, or NewWave (to name just a few), as text-menu entries in the style of File Commander, or as both, as in HotWin. Task icons may be gathered in Program Manager-like groups, arrayed in toolbars or toolboxes, or made accessible individually on the desktop or in picture-based launch lists. Whatever the details, the task-centered approach to work flow offers a potential efficiency boost by accommodating the way each of us understands the work process.

SUPERCHARGED AUTOMATION

Another dimension that some of these programs offer is the ability to automate your work with macros and scripts, a capacity available only in rudimentary form in Windows 3.1. NDW, File Commander, SmartPad for Windows, and Synergy, for example, all offer full-blown script languages with branching and if-then logic. With the exception of SmartPad, all have editors for altering and extending recorded macros. Then there is NewWave, whose Agent programming language is so powerful that calling it a macro language is almost misleading. NewWave is too complicated for most ordinary users and getting the most out of it requires using "NewWave-aware" applications, but in competent hands it can automate elaborate multistep procedures across multiple applications that would defeat its competitors.

Traditionally, you execute macros or scripts with hotkey combinations or by selecting them from menus. Five of the programs reviewed here, however, let you run your scripts by clicking on icons. The designs are individual: hDC Power Launcher keeps icons on its power bar;

SmartPad lets you create floating icon pads; and Synergy, WinEZ Pro, and NDW let you create floating toolbars that can be attached to and launched with applications or left floating on the desktop for use with all applications.

BEYOND THE DESKTOP

Many of these products go far beyond program, file, and task management, providing rich sets of utilities. The king of selection in this regard is NDW, which stuffs a huge repertoire of extras (including backup, virus protection, and disk utilities as well as calculators, an icon editor, and a file viewer that supports a range of data and graphics formats) into its capacious box. Another product notable for its abundant extras is Synergy, which includes a sound-file manager; Picasso, an exceptional icon editor; and Psychic, an elegant program that keeps track of all the files you have ever opened within Microsoft Windows and pops up the list for selection whenever you activate a File Open dialog box.

Altogether, these programs add a lot of extra value to your Windows desktop. Read on for details.

Amish Software Inc.

Amish Utilities for Windows

BY BARRY SIMON

Symantec Corp. made the idea of retail vendors licensing shareware products respectable when it began including versions of 4DOS in The Norton Utilities and Winbatch in The Norton Desktop for Windows. Amish Software has taken the next logical step by gathering the six best shareware Windows utilities into a single \$99 retail package. Three of the components of Amish Utilities for Windows, Version 1.0—Amish Launch, Amish Desk, and Amish File—add up to a reasonably complete Windows desktop replacement.

NO FREE LAUNCH

Amish Launch is basically a minimalist pop-up menu, invoked with a click on the desktop or a user-selected hotkey. The menu can have multiple levels and users can assign hotkeys to any or all menu items. The good news about Amish Launch's hotkeys is that they work from

SUITABILITY TO TASK

Amish Utilities for Windows

	POOR	FAR	GOOD	EXCELLENT
Customizing desktop				
Managing files				
Automating work flow	N/A			
Controlling environment				

inside Windows applications—that is, you can launch one app from within another. The bad news is that they do *not* work from inside DOS applications, and—much more important—they do not *move* you from one application to another. If you hit the hotkey for an application while it is already running, Amish Launch loads another session of the same application.

Additional advantages of Amish Launch include the fact that it uses resources very sparingly, it is fast, and, much like DOS key, its run box keeps a history of recent commands.

Further shortcomings include the absence of an option that will prompt for a file name during a program launch. In addition, you cannot drag and drop to reorganize the menu structure; you must cut and paste. Finally, on-line help is absent, and the dialog boxes are visually unattractive.

DESK SET

Amish Desk is a virtual desktop (see the sidebar "Navigating the Windows Workspace with Virtual Desktops") identical to SP Services' BigDesk. (BigDesk is a component of BackDesk, which is re-

FACT FILE

Amish Utilities for Windows, Version 1.0

Amish Software Inc., 541 Cowper St., Suite A,
Palo Alto, CA 94301; 800-262-6474,
415-323-4627; fax, 415-323-0138

List Price: \$99.

Requires: Windows 3.0 or later.

In Short: Amish Utilities for Windows is a collection of utilities with an adequate launch program, a virtual desk utility, a file manager with unique clipboard links, an excellent notes program, and elegant time and memory displays.



ON READER SERVICE CARD



EASY IS using 32 character names for files, directories, and subdirectories instead of 8 character DOS names. So you can use the world's fastest file finding utility. **Your eyes. NewWave. The easiest way to organize your work.**

NewWave

The Easy Desktop Manager For Windows



Save \$25 on NewWave! Call 1-800-554-1905 Ext. 208 or see your dealer.

© 1990 Hewlett-Packard. Windows is a U.S. registered trademark of Microsoft Corp.

CHUCK WATSON, FORT MONMOUTH, NJ

Windows Desktop Managers

viewed here separately.) Amish Software does not provide integration between Amish Launch and Amish Desk; you cannot use Amish Launch to load a program in a particular place on the big desktop.

Amish File, on the other hand, handles all the standard file and directory operations. Its button-based interface is attractive, although drag-and-drop would be a welcome addition. You can view only a single directory except during copy or move operations, when the target directory is also visible. The only file viewers provided are hex and text, and the utility has no search capability. Amish File is distressingly slow in handling large directories; during our tests, clicking on any filename in one directory on a disk with 325 files caused the hourglass to pop up for 12 seconds.

One unusual—and notable—feature of Amish File is its clipboard links. It stores a virtually unlimited number of text fragments that were formerly in the clipboard (including any text deleted using the cut command), and lets you paste them back into the clipboard for later placement in your document.

The three remaining utilities are nicely done extras. Amish MemoPad, a handy note editor, is identical to WinPost, a *PC Magazine* Best of 1991. Amish Clock displays the date and time in a neat little bar on-screen and has scheduling capabilities that include an alarm and a launch program. Amish Mem displays a bar where you can choose to show free memory and/or resources, or free space on specified disk drives.

While Amish Utilities is an uneven

collection of mini-applications, some users will doubtless find useful components among them.

Attitash Software Inc.

AttiTools

BY EDWARD MENDELSON

Attitash Software's \$99.95 AttiTools, Version 1.0, helps you manage files by integrating three utilities: a text-and-file searcher, a file manager, and a program that reports on disk space usage by files that have the same extension. AttiTools also offers a unique program launcher that supplements Windows' Program Manager but cannot function without it. Each component of AttiTools is built on an excellent idea, but unfortunately, none of them fully realize those ideas.

The core of the package is Catalyst, a file manager with multiple drive and directory windows, a collapsible tree diagram, and built-in file compression and encryption. You click on a folder icon to create a directory; you use a trash can icon for deletions. An optional feature lets you duplicate the full path when transferring files: If you copy a file from C:\DIR1 to another drive, the program creates DIR1 on the new drive.

SUBSTANDARD FACE

Catalyst's interface doesn't match today's Windows standards. You use one mouse button to copy a directory on the same drive and the other button to copy between drives. You manipulate files with the right mouse button (or with Ctrl-left button). To move files instead of copying them, you change a setting on the menu.

AttiTools' filesearcher, Dragnet, permits Boolean searches with AND and OR, but not with NOT. You can look for groups of strings that occur near each other and send the list of matching files to Catalyst for processing. Dragnet repeatedly gave me a spurious error message that a file called WINSPool was in use; no other search program had this problem. A design oversight causes one of Dragnet's screens to use the same shortcut key for

SUITABILITY TO TASK				
AttiTools				
	POOR	FAIR	GOOD	EXCELLENT
Customizing desktop	●	●	●	○
Managing files	●	●	●	○
Automating work flow	N/A			
Controlling environment	N/A			

FACT FILE

AttiTools, Version 1.0

Attitash Software Inc., 20 Trafalgar Sq.,
Nashua, NH 03063; 800-736-4198,
603-882-4809; fax, 603-882-4936

List Price: \$99.95

Requires: Windows 3.0 or later.

In Short: AttiTools is an awkwardly designed set of utilities for file searching, file managing, and program launching. The product includes unique features such as a launcher that finds any item in Program Manager when you type its first few letters, but these features do not outweigh the package's weaknesses

ON READER SERVICE CARD

searching and sorting, so the search shortcut key gets you to the sort option, not the search option.

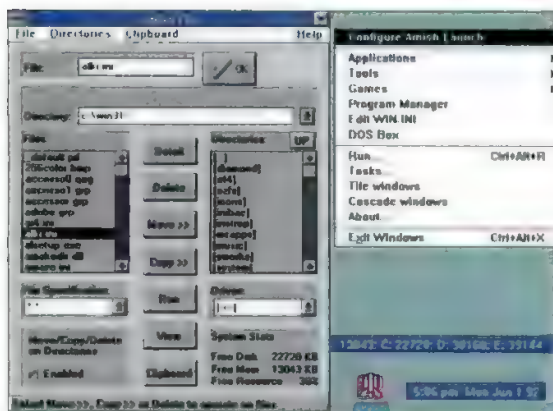
The program launcher, Slingshot, reads your current Windows Program Manager groups and displays a button for each item. When you type a few letters, the names of matching items from all groups appear on the buttons—a unique convenience. Unfortunately, the program works only with applications; if you try to launch an associated document file like README.TXT, you get only an error message.

AttiTools will be a valuable package when everything in it is as good as its unique features. Meanwhile, it is notable as much for its weaknesses as for its originality.

SP Services
BackDesk

BY LENNY BAILES

BackDesk, Version 2.32, a shareware product from SP Services in the United Kingdom, falls into the category of Windows desktop enhancements we have dubbed "minimalist shells," in which sim-



Amish Utilities for Windows includes a file module, a simple pop-up menu utility, and programs that display memory and/or file resources and the date and time in neat little strips.

■ Navigating the Windows Workspace with Virtual Desktops

by Lenny Bailes

Windows lets you multitask your applications; that's good news. The bad news is that with Windows' Program Manager, File Manager, and several productivity applications all active on the desktop at once, your screen display gets quite cluttered. A larger display monitor, while helpful, is only a part of the solution.

SIMULATED REAL ESTATE

Imagine a Windows desktop that consists of not just one 640-by-480 screen, but anywhere from 9 to 64 individual screens ganged together—each with its own set of neatly arranged icons and application windows. Each of these screens is a virtual window, mapped to a specific set of applications.

On virtual desktop No. 1 you might display Program Manager and File Manager. Desktop No. 2 could display Word for Windows, while desktop No. 3 contains the DOS version of Lotus 1-2-3. As you move to the virtual desktop of your choice, the applications running in it are shown on your actual screen.

Most virtual desktop products do more than just switch between virtual desktops. For example, some allow you to load a predefined suite of applications automatically, specifying a position on the virtual desktop for each application. Some allow you to rearrange the relative positions of your apps by dragging their icons to new locations on the miniature grid map, which is a near-universal feature of virtual screen products.

Navigating from desk to desk may mean double-clicking on the desktop map, using a task list, or using hotkey combinations. The more graphically adept packages scroll intelligently

from desktop to desktop whenever you place the mouse at the edge of your visible screen.

Here's a look at ten virtual desktop packages; six are standalone products. One of these, Rooms for Windows, from XSoft (a division of Xerox Corp.), uses a different metaphor ("rooms," as opposed to desktops) and takes a distinctly different, more object-oriented approach to the virtual desktop concept. The remaining four are components of more comprehensive desktop managers.

ROOMS WITH A WINDOWS VIEW

Rooms for Windows takes a fairly radical approach to virtual desktops by providing a way to organize multiple virtual environments. While it is not an exceptionally handsome product, Rooms, the culmination of extensive research conducted at Xerox Palo Alto Research Center, is both different and powerful.

Xerox designed Rooms to be used in a way that reflects how people think and organize. So, for example, you might set up a desktop publishing room, a spreadsheet room, or a file management room. Each room contains the appropriate applications, open and ready for use. A start-up "Overview" map uses icons to display the entire "suite" of rooms with all their open applications and files. Rooms preserves the entire desktop configuration, dynamically tracking the document loaded in each launched application.

ROOM FOR ALL

You can get a zoomed-in view of an individual application by clicking on its representation in the Overview map. To access the application, though, you have to click on its room and then click

again in the application to make it active. (By contrast, most other virtual desktops use a more direct path, switching to the appropriate screen and activating an application with a single mouse click.)

Once you enter a room, it becomes your Windows desktop until you decide to leave. You move from room to room either by clicking on a "door" icon or by placing the mouse pointer at the edge of the screen and panning.

The first room, called the Overlay room (not to be confused with the Overview map), is a template. Programs open in the Overlay room are duplicated in all other rooms. By default, Rooms places everything on your original desktop in the Overlay, duplicating the original desktop in every new room and causing quite a bit of confusion. You will probably want to customize the Overlay and bypass this default.

COOL STUFF

You can set up a suite of rooms, specifying that applications start up either in a single room or globally in any designated room. Multiple suites can be set up and saved, too, so you can quickly run alternative desktop scenarios. Preconfigured sets of rooms can be loaded from a pull-down menu in the Overview map.

Rooms also allows full-screen DOS applications to be set up as separate rooms. If you click on a 1-2-3 or WordPerfect room in the Overview map, Windows switches to the DOS application in full-screen mode. Attitash Software's WideAngle is the only other virtual desktop product that offers this feature.

Rooms can quick launch Windows or DOS programs by placing "launch
Continued

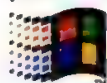
Why point with your fist, when you can point with your fingers?



It's natural that pointing with your fingers is easier than pointing with your whole hand.

That's why we created PC Stylus™, the mouse that's shaped like a pen.

The moment you pick up PC Stylus you'll find its smooth responsiveness and improved control make it the obvious choice for any drawing application. And you'll find its comfortable feel and



MICROSOFT
WINDOWS™
COMPATIBLE

elegant styling make it a natural choice for Microsoft Windows™ or other mouse-driven software, too.



Use PC Stylus as a trackball, too

PC Stylus makes more sense for your notebook computer. It requires no pad and runs on the smallest possible surface. If you have no space at all, simply turn it over, and PC Stylus becomes a

comfortable hand-held trackball.

Change resolution with the click of a button, anywhere from 200 up to 1600 dots per inch. There's no need to exit your application. And 400 dots per inch hardware resolution assures you of the latest, state-of-the-art technology.

With PC Stylus you won't have to worry about compatibility either. Three easy-to-reach buttons and Microsoft, Mouse Systems and PS/2™ modes ensure that PC Stylus will work wherever you choose. And with its handsome protective carrying case

and three-year warranty, you're assured of trouble-free pointing for years to come.

Get your PC Stylus today for just \$89.95. It's the natural way to point.

Call 1-800-833-4674



IMSI, 1938 Fourth Street, San Rafael CA 94901
Tel: 415-454-7101, Fax: 415-454-8901

Package includes 3-1/4" and 3-1/2" disks, Windows cursor utility, carrying case, 9, 25 and PS/2 adapters and three-year warranty. PC Stylus can be found at: Babbage's, Computer City, Electronic Boutique, Elek-Tek, Fry's Electronics, Micro Center, Software ETC, and other fine computer stores. © 1992 IMSI. All Rights Reserved. PC Stylus is a trademark of IMSI. All other trademarks acknowledged.

CIRCLE 110 ON READER SERVICE CARD

IMSI™

Trade memories with your friends.



Memories.

Remember the time you borrowed the company laptop and couldn't find the files you left in the hard drive? Or the time you needed to get at some data in the hard drive when someone had the computer on the road?

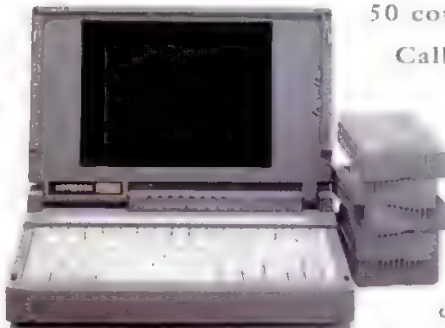
Aurum's brand new notebook computer — *with interchangeable 2.5" hard drives* — will make such unpleasant memories a thing of the past. Because now each of the notebook's users can have a 60, 80, or 130 MB hard drive of their very own. Not only is data security enhanced, but the hard drives can be connected to any of our powerful desktop systems so data is available even if the notebook isn't.



You may be unfamiliar with the Aurum name, but you are familiar with Aurum products. Since 1980, we have designed and built literally hundreds of thousands of computers for leading companies in over 50 countries throughout the world.

\$1,995

- Intel486™ SX/25 with 8KB cache
- 4 MB RAM expandable to 16 MB
- 80 MB drive; 6.3 lbs. total wt.
- Advance Power Management for longer battery life
- External keyboard & 100 pin ports
- 640 x 480 VGA LCD Display
- Windows 3.1 and DOS 5.0
- Additional disk drives:
80 MB \$399, 130 MB \$499



Call us right now at **800-55-AURUM** and order a notebook and some hard drives that you can exchange with your friends. Because Aurum's price, performance, service and support are the finest in recent memories. **800-55-AURUM**



Virtual Desktops

CONTINUED

button" icons in any room. Unfortunately, you can't place them in the Overview map. Also, in the Overview map, Rooms disables the built-in Windows *cool switch*—the Alt-Tab switch that displays the name of the active application as you toggle between apps—so you probably don't want to make the Overview map your command center.

WIDE-ANGLE DESKTOPS

WideAngle, a standalone virtual desktop product from Attitash Software, is in many ways similar to Rooms, although much more straightforward in its approach. It provides hotkeys to switch between its Windows "desks." You can also switch applications by clicking on their representations on the desktop map.

WideAngle allows you to auto-start applications in specified desk positions, but it will only track particular documents and files if you indicate such associations in advance.

Like Rooms, WideAngle can run DOS programs in individual desks, either in full-screen mode or in sizable windows. Also like Rooms (but unlike most of the other virtual desktop products), WideAngle lets applications migrate—or "tag along"—from desktop to desktop, so they can be used in different contexts.

GANG OF FOUR

Generally speaking, these four virtual desktop products, which are included as part of full desktop managers, resemble WideAngle. But none of these have support for running a full-screen DOS program as a separate "desktop" the way that Rooms and WideAngle do. Only WinTools' BigSky supports the tag-along feature.

Gallery, a component of HotWin, is limited to nine virtual desktops, but it allows auto-starting of applications and hotkey switching between desktops. It also provides a hotkey that pops up the desktop map. Gallery activates

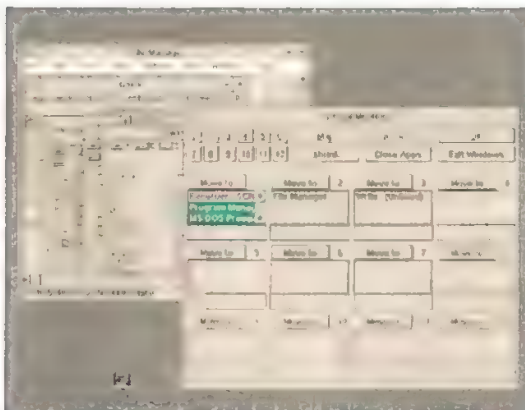
applications when you switch to a specified desktop, but it has no tag-along feature to clone apps from one desktop to another.

hDC Power Launcher's hDC Desktop can handle up to 64 virtual desks and can use a launch list to start applications in specified desktops. By default, you switch between desktops by using the cursor keys rather than the mouse. The program also permits hotkey switching between desktops and allows you to make the desktop map any size you like.

WinTools' BigSky module permits a maximum of 16 virtual desktops. In keeping with its drag-and-drop, object-

desktops and/or applications from a series of pop-up menus and hotkeys. It supports a fixed maximum of 12 desktops. The strength of this package is in its ability to rearrange the superdesktop easily. One or more applications can be selected and easily transferred from desktop to desktop with a single mouseclick. Like Rooms for Windows, Virtual Monitors allows you to create and save multiple desktop suites that can be loaded on the fly. Virtual Monitors also includes a smart minimize/restore feature that iconizes unused applications and automatically pops up the active application in a desktop, which greatly reduces desktop clutter.

PC Magazine found a bug in Virtual Monitors' automatic start-up routine for DOS applications that has now been patched. The patched version may be downloaded by registered users on CompuServe or obtained directly from Baseline Publishing Co.



In Virtual Monitors, moving applications from virtual desktop No. 2 to other desktops is as easy as selecting the application name and clicking on "Move To".

oriented approach, the program allows you to auto-start programs in specified desktops, but only through a convoluted configuration process of dragging icons onto WinTools object controls. You can also set up a hotkey switching process for BigSky by using WinTools, but it is not easy.

BigDesk, part of BackDesk and bundled with the Amish Utilities (and the original ancestor of all Windows virtual desktops), currently has the fewest features of the lot. Although it allows up to 64 virtual desks, it has no provisions for auto-starting applications or for hotkey switching.

HOTKEY SPECIALISTS

Virtual Monitors is an extremely flexible package that switches between

additional technical documentation and a series of utility enhancements.

TopDesk allows for a seemingly unlimited number of virtual desktops, which puts it in a category by itself. Applications can be set to start up automatically by creating "ghost windows" in a desktop. When you click on a ghost window, TopDesk starts the corresponding application.

You switch between virtual desktops or applications using the right-hand mouse button or the numeric keypad, and TopDesk itself can be popped up with either the keyboard or the mouse. As the complete Resource Kit costs only \$19.95, TopDesk certainly qualifies as the most economical of all the virtual desktop packages. □



HP LaserJet III Si

Forget about pa Let's talk about



In a series of tests, we compared the QMS-PS® 1700 to the HP® LaserJet® III Si. The result? In one 8-hour day, we delivered 2½ times more productivity. From the same 17ppm engine.

The reason is our Crown™ architecture. A unique combination of hardware and software that lets the QMS-PS 1700 print one document while receiving

and processing another. With no operator intervention. And no lost time.

Our Emulation Sensing Processor (ESP) technology recognizes incoming data streams on any of three ports and chooses the

right language. So users don't have to stop and reset the printer.

With Simultaneous Interface Operation (SIO),

Only QMS has Crown architecture. Both the 17ppm QMS-PS 1700 and the 20ppm QMS-PS 2000 departmental printer have it.



©1992 QMS, Inc. QMS, QMS-PS and the QMS logo are registered trademarks of QMS, Inc. All other brand names and products are trademarks or registered trademarks of their respective holders.



QMS-PS 1700

ges per minute. pages per day.

the QMS-PS 1700 can receive data across standard and optional interfaces, from multiple platforms and multiple networks. Simultaneously.

**WHY
QMS
BEATS
HP**

We'll use the QMS-PS 1700 to print you a copy of these test results. With our Crown architecture, it won't take long.

As a result, this is a real network printer. Not just a printer on a network.

If you'd like to see what a difference our capabilities make, call 1-800-422-2769 ext. 2937. And we'll send you the full results of

our tests against the HP LaserJet III Si.

And you can see why QMS makes the best printer for your work group. Because we have stacks of evidence to prove it.

QMS Finishes First.



Windows Desktop Managers

plicity and accessibility are key elements. BackMenu (one principal component of BackDesk) makes it easy to open your favorite Windows programs, circumventing Windows' built-in Program Manager. Only a mouse click away at all times, BackMenu pops up a user-definable set of nested menus that can launch programs, access your Program Manager groups, or replace specified Program Manager tasks. You can also summon BackMenu with an assigned hotkey or install BackDesk as your start-up Windows command shell.

The nested menu structure for your Program Manager groups is updated automatically each time BackDesk loads. The default BackDesk setup provides access to Program Manager's run box, System Information, and Control Panel functions as well as to your program groups. You can add customized launch lists and dynamic link library calls to BackMenu by editing the BACKMENU.INI file using Windows' Notepad. Additional features allow you to launch Windows applications from a DOS command prompt

SUITABILITY TO TASK				
BackDesk				
	POOR	FAIR	GOOD	EXCELLENT
Customizing desktop	☒	☒	☒	☐
Managing files	N/A			
Automating work flow	☒	☐	☐	☐
Controlling environment	☒	☐	☐	☐

inside of Windows and pop up BackDesk's other component, BigDesk.

BigDesk, one of the original "virtual screen" enhancers for Windows, multiplies your Windows screen real estate. It lets you move freely among as many as 64 full-screen desktops, each containing its own series of Windows and DOS applications. The ability to place applications in multiple desktops makes your Windows sessions much less cluttered. The BigDesk minimap allows for easy task switching—you can keep it visible in each virtual desk or pop it up with BackMenu as needed. (See the sidebar "Navigating the Windows Workspace with Virtual Desktops" for more details on how virtual desktop utilities can enhance Windows productivity and file management.)

BackDesk allows an unlimited number of submenu program groups, outdoing, for example, Abacist Software Co.'s

FACT FILE

BackDesk, Version 2.32

SP Services, P.O. Box 456, Southampton,
United Kingdom SO9 7XG; 44 703 550037;
fax, 44 703 550037

List Price: Registration and disk, \$66.50; \$57 on mention of *PC Magazine*. Software available on CompuServe's WINADV forum as DSK234.ZIP and on local BBSs.

Requires: Windows 3.0 or later.

In Short: This (shareware) minimalist shell circumvents Windows' Program Manager, giving you easy program launching and easy movement between running applications (via its BigDesk component, the original virtual desktop). Compared with those of some of the commercial competition, the implementation can be rough at times.

 ON READER SERVICE CARD

HotWin (reviewed separately in this story), which displays a maximum of 20 menu options and 10 group submenus. BackDesk's automatic recognition of new program groups is another definite plus. HotWin requires you to add new groups to its menu manually.

On the other hand, even though BackDesk combines useful functions of both shell and virtual desktop utilities, there are some definite rough edges to the implementation. For example, BackMenu can automatically launch applications on start-up, but BigDesk won't automatically place them in other virtual screens. You must do this manually each time. Compared with HotWin, BackMenu also incorporates fewer overall features. It does not have an internal file manager, a "hot" task list, a screen saver, or anything equivalent to HotWin's multiple Quick Commands. Nonetheless, BackDesk is one of the less expensive desktop managers in this review, combining features that would cost at least \$99 in the other packages. Also, its author continues to issue shareware upgrades at regular intervals.

Abacus Software Inc.

BeckerTools

BY EDWARD MENDELSON

For \$129.95, Abacus Software's BeckerTools, Version 3.0, gives you Windows versions of virtually every disk and

file utility you can imagine—and some you never imagined. The heart of the package is an elaborate file manager, which is linked to a file viewer and a text editor and is optionally controlled by a customizable toolbox. Among its thoughtful features is a special module for editing .INI files. The rest of the package bears more resemblance to DOS collections like The Norton Utilities than to other Windows utility collections.

This Norton-like group comprises a defragmenter, a hex editor, utilities for testing and editing disks, and other programs rarely found in Windows versions. Also included are unique Windows programs such as utilities that make multiple copies of and archive files to floppy disks and an undelete feature that lets you split off part of a file when only part of a file will load into an application.

ALL DRESSED UP...

The Becker programs all appear impressively well designed and feature-packed, even if some of the packages' myriad icons are initially obscure, and some, unfortunately, aren't quite as impressive in action as in looks. The full-featured file manager allows intuitive drag-and-drop manipulation of files and directories, and its floating, customizable toolbox lets you access any of its features with a mouse click. But it only lets you search for text on one drive at a time, and unlike Windows' File Manager, it does not let you

SUITABILITY TO TASK				
BeckerTools				
	POOR	FAIR	GOOD	EXCELLENT
Customizing desktop	N/A			
Managing files	☒	☒	☒	☐
Automating work flow	N/A			
Controlling environment	N/A			

open more than two directory lists. Worse, it doesn't stop you from destroying a file by copying it from a SUBST drive to its equivalent directory. While the name of the file manager is SHELL.EXE, it is not designed to serve as a replacement Windows shell.

The file viewer cannot display most documents in their native formats and doesn't support common graphics formats such as .WPG. When I tried to open TIFF files on my disk, most of them caused the

SYDOS INTRODUCES THE FAST CAT WITHOUT THE FAT CAT PRICE.



REMOVABLE CARTRIDGE DISK DRIVE. In today's wild, fast-paced world of computer technology, there's a new breed of storage systems out there. It's PUMA, The Fast Cat from SyDOS—the ultimate, easy to use, removable cartridge disk drive.

UNLIMITED CAPACITY. In the heart of every PUMA drive beats the proven performance of Winchester hard disk technology—plus one major benefit. You can use as many cartridges as you want for totally unlimited storage capacity.

EASY INSTALLATION. Plug into the parallel port of any DOS- or Windows®-based desktop, laptop or notebook PC, load the installation software and watch PUMA run - instantly.

INCLUDES POWER SUPPLY. PUMA's built-in power supply eliminates the need to drain power from your PC—so you maximize the performance of your system.

REMOVE THE LIMITS. Other storage technology is higher in cost and limiting in capacity and performance. PUMA removes the limits. PUMA is quicker than tape, faster and more affordable than opticals and far more reliable than floppies. So why pay a whole lot more for a whole lot less?

PLUS. PUMA uses SyQuest cartridges, the same cartridges used in SyQuest and SyDOS products so they are interchangeable. Cartridges can be taken with you or locked up and they are ideal for high speed backup and data organization.

PUMA is built around the #1 selling SyQuest removable cartridge disk drive and comes complete with integrated parallel port interface, 44 or 88MB data cartridge, and easy installation software. With an unsurpassed 5-year cartridge warranty and 2-year drive warranty, your investment in PUMA is guaranteed.

Don't get caged into a storage system that limits your growth. Call **1-800-422-PUMA** today to find out how you can bag a PUMA. The Fast Cat without the Fat Cat price!

**PLUG INTO THE POWER
OF PUMA!**

SyDOS



6501 Park of Commerce Boulevard, Suite 110
Boca Raton, Florida 33487 Fax # (407) 998-5414



© 1992 SyDOS
™ SyDOS is a trademark of SyQuest Technology
™ PUMA is a trademark of SyQuest Technology
® Windows is a registered trademark of Microsoft

Windows Desktop Managers

FACT FILE

BeckerTools, Version 3.0

Abacus Software Inc., 5370 52nd St. SE,
Grand Rapids, MI 49512; 800-451-4319,
616-698-0330; fax, 616-698-0325

List Price: \$129.95.

Requires: Windows 3.0 or later.

In Short: A powerful but flawed file manager is the center of this program, which also includes a full suite of Windows-based disk utilities. Too many parts of this package do not work well enough to justify using it as a replacement for Windows' File Manager, but some of its programs, like a multiple disk copier, may be worth having anyway.

ON READER SERVICE CARD

viewer to close down with a General Protection Fault. The disk editor, which is powerful enough to do major damage, does not display directories or file-allocation tables in usable formats. A file-printing program is useful only for ASCII files and will not print files in native applications.

BeckerTools has the potential to develop into a premier Windows utility package. Although too few of its components currently fulfill their promises, many of its unique functions may make it worth having in its still unfinished form.

Fifth Generation Systems Inc.

Direct Access Windows

BY BARRY SIMON

Some Windows users are disconcerted by Program Manager's movable icons and would rather have fixed application

menus such as the ones they've seen in Fifth Generation Systems' DOS menu program, Direct Access. With the introduction of the \$99 Direct Access Windows, these users are getting their wish.

Version 1.0 of Direct Access Windows installs smoothly, offering to preserve your Program Manager groups and/or search your disk for the hundreds of programs it knows about—which it then adds to your menus using its own structure. For example, it might find all the spreadsheet programs and put them in a submenu called Spreadsheets. Adding new items and multilevel submenus is easy.

Direct Access Windows includes a script language and allows you to place scripts on menus as choices. The batchlike language is primitive, without any control over Microsoft Windows, but it can query the user and branch on the responses (if-then). For instance, a script can be written to launch a particular application, based on the existence of a certain file, or a file type.

TRACKING PROWESS

Under Direct Access Windows, a system administrator can set up a system of projects and track the time spent on each one. When the user launches an application, he is queried for a project name; Direct Access Windows then records the time spent working on the project, making it very easy for businesses to track billings for different client accounts, budget areas, and the like. But this information can only be tracked as long as the work is done in different files for each client, account, and so forth.

Direct Access Windows can be customized to an individual or a company taste. You can replace the package's start-up screen with your company's logo, and you can change the messages displayed at the top of each menu. Direct Access Windows also provides a large collection of icons and an icon editor, and it is one of the few programs we've seen whose built-in color selections are uniformly tasteful.

Fifth Generation Systems' Direct Access Windows is perhaps best suited as a tool for computer-support departments trying to set up Windows for

SUITABILITY TO TASK

Direct Access Windows

	POOR	FAIR	GOOD	EXCELLENT
Customizing desktop	☒	☒	☐	☐
Managing files	N/A			
Automating work flow	☒	☒	☐	☐
Controlling environment	N/A			

FACT FILE

Direct Access Windows, Version 1.0

Fifth Generation Systems Inc., 10049 N.
Reiger Rd., Baton Rouge, LA 70809;
800-873-4384, 504-291-7221

List Price: \$99.

Requires: Windows 3.0 or later.

In Short: This is a straightforward full-screen menu program for those used to DOS menu programs who want to carry that interface over to the Windows environment.

ON READER SERVICE CARD

fledgling computer users in need of hand-holding, or for seasoned DOS users who are uncomfortable with Windows' changeable interface.

Wilson WindowWare Inc.

File Commander

BY EDWARD MENDELSON

File Commander, Version 1.1, does not replace Windows' File Manager; instead, it adds to it, enabling it to do far more than manage files. After installing Wilson WindowWare's \$49.95 utility, you will find an additional drop-down menu in File Manager's menu bar, which expert users can customize to perform any of hundreds of possible functions, from running programs to broadcasting messages to all users on the network.

To customize File Commander's menu, you need to learn a relatively straightforward batch language and use a text editor like Notepad to type in the code that performs the functions you want. If you don't mind the effort, you will be rewarded with a degree of control you can't get from any other Windows menu program. If, however, you want drag-and-drop menu building, graphic conveniences, and icons, you should look elsewhere.



Direct Access Windows' fixed menus will be comforting to many users but frustrating to others.

What Daddy Never Told You About DOS Communications.



Crosstalk® Mark 4 has always been what *Lotus* magazine called, "The hands-down Big Daddy of DOS communications," but there were some things even *this* async "big daddy" never told you. Until now, not even Crosstalk Mark 4 said you could emulate terminals like the WYSE® 50/60 or the HP® Series.*

Well, the new version 2.1 says you can have these emulations and a lot more besides.

From DEC LAT To LAN Packs, Now Big Daddy Has It All!

There's DEC LAT support, so you can connect to a VAX® via Ethernet and bypass your terminal server. There's queue dialing. An enhanced host mode. And new CASL™ commands.

You can even get a network pack with LAN licensing for up to four concurrent users. If you have more than four people using Crosstalk Mark 4 at the same time, you just add more LAN packs. And watch the savings multiply.



Big Daddy, The Mother Of All Comm Packages.

Even before these latest achievements, the editors of *PC Magazine* chose Crosstalk Mark 4 as the top performer among all comm packages

CIRCLE 278 ON READER SERVICE CARD

“The hands-down Big Daddy of DOS communications packages.”

—Lotus, October 1991

for 1991, calling it “A top notch program that does almost everything and does it all right...” That’s everything from VT™ emulations and ZMODEM to FTTERM and INDSFILE. You get CASL, a powerful programming language like C or Pascal. Speeds up to 115,200bps. Multiple sessions. Modem sharing on LANs. Synchronous hardware support. The works!

Get Your Arms Around The Hands-Down Big Daddy.

To get a better grasp of Big Daddy, all you need to get is us on the phone! From the low-down on our upgrade pricing to details on our network pack, we’ll give you all the help you want.

Just call 1-800-348-DCA-1, ext. 94A.**

CROSSTALK

Another Communications Solution From DCA*

*2392A, 2394A, 2625A or 7624A. **On call (604) 475-8380 if outside the U.S. © 1991 Digital Communications Associates, Inc. All rights reserved. DCA and Crosstalk are registered trademarks and CASL is a trademark of Digital Communications Associates, Inc. All other brand and product names are trademarks or registered trademarks of their respective owners. Reprinted from Lotus Magazine, October 1991.



April 1991
Crosstalk Mk. 4

April 30, 1991
Crosstalk Mk. 4 Version 2.0

Vol. 7 No. 12 1990
Crosstalk Mk. 4

Windows Desktop Managers

THANKS, WINDOWS

File Commander is built on the Windows 3.1 feature (also used by The Norton Desktop for Windows) that lets external modules add menus to File Manager. You select files with File Manager's normal

SUITABILITY TO TASK				
File Commander				
	POOR	FAIR	GOOD	EXCELLENT
Customizing desktop	☒	☒	☐	☐
Managing files	☒	☒	☒	☐
Automating work flow	☒	☒	☒	☐
Controlling environment	N/A			

tree and directory displays, but you can use the add-in menu to access functions that you can't get from File Manager alone.

The batch language that you use to write a File Commander menu is powerful and versatile. A few lines of code let you perform any file management and program launching functions. You can also display dialog boxes, modify .INI files, hide programs, send keystrokes to applications, play multimedia devices, and perform if-then branching. The sample menu that comes with the package helps get you started.

Writing a menu is easier than making it bugproof. In the version of File Commander tested by PC Magazine Labs, even the sample menu lacked the error checking needed to avoid getting irrelevant messages from applications. File Commander can give you the most customized menu possible for running Microsoft Windows, but you may need to put in hours of hard patient work to get it working right.

FACT FILE

File Commander, Version 1.1

Wilson WindowWare Inc., 2701 California Ave. SW, #212, Seattle, WA 98116; 800-762-8383, 206-938-1740; fax, 206-935-7129

List Price: \$49.95.

Requires: Windows 3.1 or later.

In Short: A menu add-in for the Windows 3.1 File Manager, this product is powerful and flexible, but only for those willing to program a custom menu using a batch language.

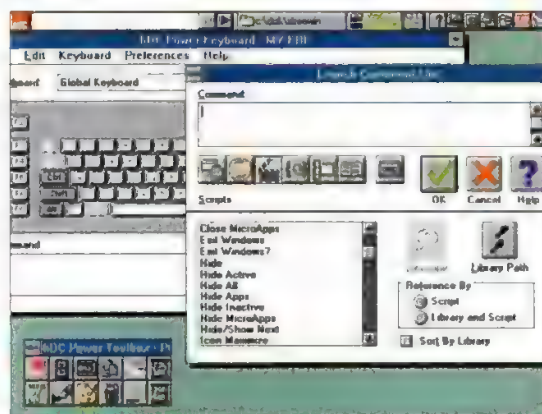
ON READER SERVICE CARD

hDC Computer Corp.

hDC Power Launcher

BY BARRY SIMON

True to its name, hDC Computer Corp.'s \$99.95 Power Launcher, Version 2.0, brings the considerable power of a scripting language to the Windows interface, although it adds no file management capabilities. Power Launcher scripts (called enhanced commands) can launch programs and automate work in a variety of ways by sending keystrokes to Windows. The package provides five different ways to access or execute its enhanced commands: a menu that pops up with any window's system menu, a strip that optionally floats at the top of the screen,



hDC Power Launcher's components include its Power Bar (shown along the top of the screen with a command line and various buttons, including user-defined launch buttons), its Power Keyboard (shown here with a visual editor in the background), an enhanced command line that includes canned scripts, and its Power Toolboxes.

keystroke or mouse macros, and floating toolboxes—all user-defined.

Since Power Launcher scripts have no if-then or other logical branching, they are more like individual DOS commands than the full-fledged batch languages found in The Norton Desktop for Windows or Synergy. This limitation aside, Power Launcher's command lines are powerful: With them you can load or switch to a program or change its icon and caption. You can embed the date in the command line or prompt for a filename. There are over 70 command fragments in all, including items like "cascade all," "exit Windows," "sound hornpipe," and "shift printer to landscape." An enhanced

SUITABILITY TO TASK				
hDC Power Launcher				
	POOR	FAIR	GOOD	EXCELLENT
Customizing desktop	☒	☒	☒	☒
Managing files	N/A			
Automating work flow	☒	☒	☒	☒
Controlling environment	☒	☒	☒	☐

command can also include keystrokes and Dynamic Data Exchange or DLL calls to perform complicated tasks.

Scripts are set up via a powerful, easy-to-use command builder dialog that includes a recorder and a history list of previous commands. The design of this dialog includes thoughtful extras; for example, you can invoke a movable, stretchable box to place size and position parameters in the appropriate dialog fields.

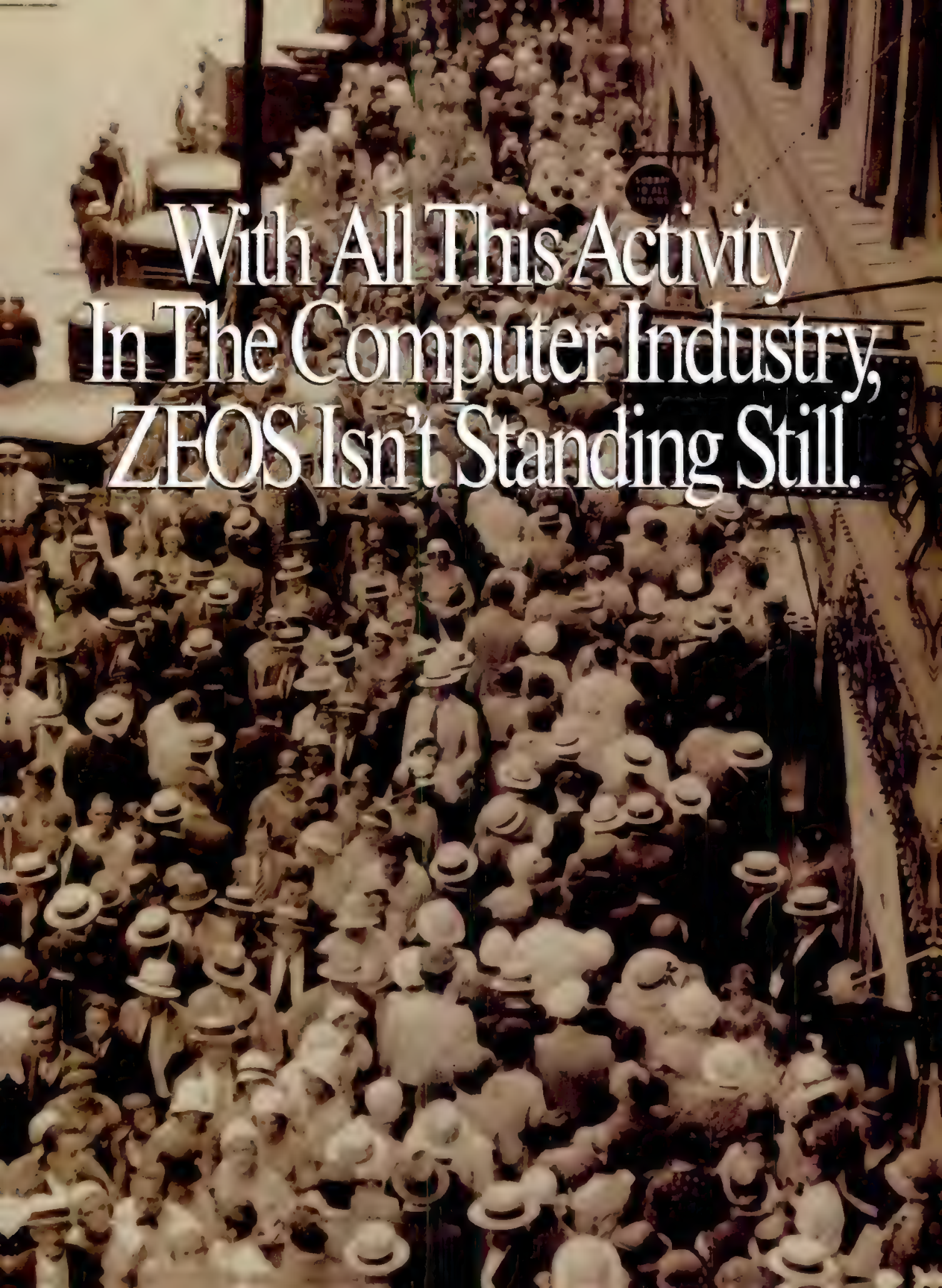
SYSTEM MENU AND POWER BAR

When you load Power Launcher, it adds two commands to each application's system menu. One hides the app, and the other keeps it in view. A menu maker lets you add multiple levels of items to the system menu, each calling a different script. In addition, an item is added to the Task List, which displays hidden applications along with "normal" ones.

Power Launcher's optional floating bar (the "Power Bar"), which appears at the top of your screen, includes a miniature command line that you can type in directly and a button that invokes the full enhanced-command builder. On the right are user-defined buttons that issue enhanced commands. Under Windows 3.1, these can be drag-and-drop targets, so, for example, you can have a button which launches Notepad with a file dialog box or with a specific file, if you drag the file from File Manager.

MORE ODDITIES

Scripts can also be integrated with some of Power Launcher's other features. For example, the program has virtual desk capability (see the sidebar "Navigating the Windows Workspace with Virtual Desktops")—up to 64 virtual desks—but you'll probably be happy with the default



With All This Activity
In The Computer Industry,
ZEOS Isn't Standing Still.



As A Matter Of Fact,
We're Speeding Up.

Announcing
66MHz Power.

ZEOS COMPLETE SYSTEM PACKAGE #1

- The processor and speed of your choice plus future upgradability!
- 1MB of high-speed RAM, expandable to a system total of 32MB right on the motherboard.
- 42MB high-speed IDE hard drive with its own cache.
- 1.2MB or 1.44MB Teac® floppy drive.
- ZEOS 14" flat screen Hi-Res amber monitor with Tilt/Swivel base.
- Shadow RAM and EMS support for enhanced performance.
- ZEOS/RS 101-key SpaceSaver keyboard.
- Two serial, one parallel & one game port built right onto the motherboard.
- 7-16, 1-8 bit expansion slots.
- Rugged ZEOS SpaceSaver case with twin cooling fans for added reliability and product life.
- Seven drive bays and our high-capacity power supply with built-in surge suppressor!
- Includes ZEOS 24-Hour-a-Day Toll-Free Technical Support and Customer Satisfaction package.

INCREDIBLE ZEOS PACKAGE #2

We take Package #1 and upgrade your ZEOS Modular System to include:

- 2 full Megabytes of rip-roaring RAM.
- Our incredible 107MB IDE hard drive with its own built-in cache.
- Both the Teac® 1.2MB and 1.44MB floppy drives.
- Diamond SpeedStar 24X VGA accelerator card/1MB RAM. Halo Desktop Imager software!
- ZEOS 14" Hi-Res VGA mono monitor with Tilt & Swivel base.
- Microsoft Mouse, Microsoft Windows and DOS, plus 2 out of 3 Windows applications: Lotus 1-2-3 for Windows, Ami Pro, and Freelance Graphics!

Pick Your Package

Or We Can Build To Your Exact Specifications

Now, ZEOS lets you pick exactly the power you want for the price you want to pay. Simply match the processor with the package configuration and you have your price. Or if you wish, we will custom build any system to your exact specifications.

And don't forget, with every ZEOS Windows System (packages 2, 3 and 4) you'll also receive your choice of 2 out of 3: *Lotus 1-2-3 for Windows*, *Ami Pro*, and *Freelance Graphics*. The Lotus software alone carries a suggested retail of over \$1000 and even street prices are over \$700. Yet we're giving it to you at *no additional charge!* That's ZEOS value.

No doubt about it. ZEOS has broken the price/performance barrier with these great new upgradables, and you're the beneficiary. Incredible power, upgradability, and software!

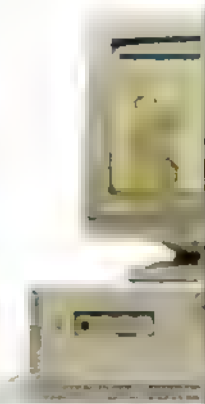
PACKAGES 2, 3 AND 4 IN

	Pkg. #1	Pkg. #2
486SX-25	\$1295	\$1495
486DX-33	\$1495	\$1695
486DX2-50	\$1695	\$2195
486DX2-66	\$2195	\$2495

Add \$200 to any package for Windows System.



Lotus 1-2-3



Freelance Graphics

FREE

Packages 2, 3 and 4 come complete with Windows application software.

Power, and Price!

Build A System Specifications.

**NEW
LOWER
PRICES!**

INCLUDE LOTUS BUNDLE!

Pkg. #2 Pkg. #3 Pkg. #4

795	\$2195	\$2495
995	\$2395	\$2695
195	\$2595	\$2895
695	\$3095	\$3395

price for a 128K cache.

PICK YOUR PAYMENT OPTION TOO:

When you buy from ZEOS you have a wide variety of payment options. We accept MasterCard, VISA, American Express and Discover cards, or if you wish we can ship COD.

We also have our own ZEOS credit card, the Z-Card™. The Z-Card allows you to charge your ZEOS purchases just like a

MasterCard or VISA. We can send you an application or you can apply right over the phone. (Our special toll-free Z-Card application hotline is 800-421-8942.)

ZEOS also offers a terrific leasing program for businesses. The rates are lower than those charged by most of the others in our industry.

We will promptly mail or fax you an application on request.



Graphics Ami Pro

FTW ARE

plete with your choice of two
s from Lotus—free!

INCREDIBLE ZEOS PACKAGE #3

Add even more memory, a larger drive. And more savings! You now receive:

- 4 full Megabytes of ultra-high-speed RAM.
- Our fast 130MB IDE hard drive with built-in cache.
- Teac® 1.2 & 1.44MB FDD's!
- Diamond SpeedStar 24X VGA accelerator card/1MB RAM. 16 million colors. Halo Desktop Imager software!
- ZEOS 14" 1024x768 non-interlaced VGA Color monitor w/Tilt & Swivel.
- Microsoft Mouse, Microsoft Windows and DOS, plus 2 out of 3 Windows applications: Lotus 1-2-3 for Windows, Ami Pro, and Freelance Graphics!

THE ULTIMATE ZEOS PACKAGE #4

Now, memory goes to 8MB and the drive to 245MB. PC Magazine Editors' Choice configuration!

- 8 full Megabytes of high-speed RAM.
- Your screaming 245MB IDE hard drive with its own built-in cache.
- Teac® 1.2 & 1.44MB FDD's!
- Diamond SpeedStar 24X VGA accelerator card/1MB RAM. 16 million colors. Halo Desktop Imager software!
- ZEOS 14" 1024x768 non-interlaced VGA Color monitor w/Tilt & Swivel.
- Microsoft Mouse, Microsoft Windows and DOS, plus 2 out of 3 Windows applications: Lotus 1-2-3 for Windows, Ami Pro, and Freelance Graphics!

**ORDER NOW TOLL FREE
800-423-5891**

Fax Orders: 612-633-1325

Govt.: 800-245-2449

Outside U.S. and Canada

Call: 612-633-6131

Hearing Impaired (TDD):
800-228-5389

MasterCard, VISA, Discover,
Am Exp, Z-CARD, COD and
Leasing Programs.

GSA# GS00K91AGS5176

Open 24 Hours a Day,
365 Days a Year!



**ORDER NOW TOLL FREE:
800-423-5891**

The New ZEOS[®] 486DX2-66.

Think this kind of power is out of your budget? Take another look. While hardly anyone else offers 66MHz power, now you can own a new ZEOS 486DX2-66 starting complete for as low as \$2195!

THE KIND OF POWER YOU NEED FOR THE APPLICATIONS YOU USE.

Face it. We're working with increasingly sophisticated—and powerful—operating environments these days. Whether you use Windows, OS/2 or UNIX, you need a system that can handle complex applications with speed and ease. One that makes computing a pleasure.

Enter Intel's new speed doubler technology. Intel's 486DX2 *doubles* the external system clock signal it receives through the system bus. It all comes down to faster performance. And when your ZEOS 486 Upgradable is cooking along at 66MHz, you can expect a performance boost. *Performance that's 10 to 30 percent faster than a 486-50.* We're talking *fast!*

HOT SYSTEMS THAT KEEP COOL.

With many systems, running faster means running hotter. Not so with ZEOS. All our desktop systems include not one, but *two whisper-quiet cooling*

fans. By keeping things cool we help to make sure your system lasts longer. Check the competition; you won't find many others who offer this feature. It's an important part of ZEOS value.

YOUR ZEOS EXTRAS. NO EXTRA CHARGE.

And remember, your new ZEOS Windows system comes complete with your choice of two out of three great Windows applications:

Lotus 1-2-3 for Windows, Ami Pro and Freelance Graphics. These aren't trial copies or sample disks—they're full-blown, fully-documented production packages. And, with a sug-

Consider the Vertical Option. We can build your new upgradable system in our eight-bay vertical case. It comes complete with our high-capacity power supply and two cooling fans. Add only \$95.

gested retail of close to \$1000, even at "street prices" that's a great value.

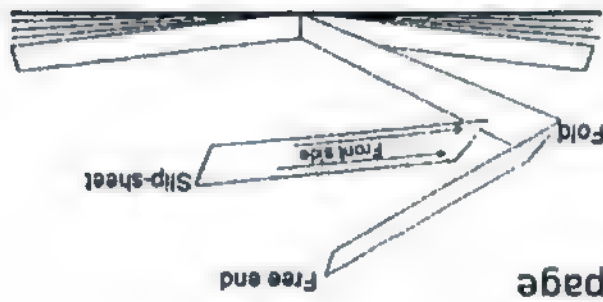
Remember too, ZEOS also provides you with 24-Hour Support, our 30-Day Money-

Back Guarantee, One Full Year Limited Warranty and our Express Parts Replacement Policy.

Ordering your new ZEOS is easy. Just pick up the phone and give us a call. You're going to love your new ZEOS '66. And that's a guarantee! Call now toll free: 800-423-5891.

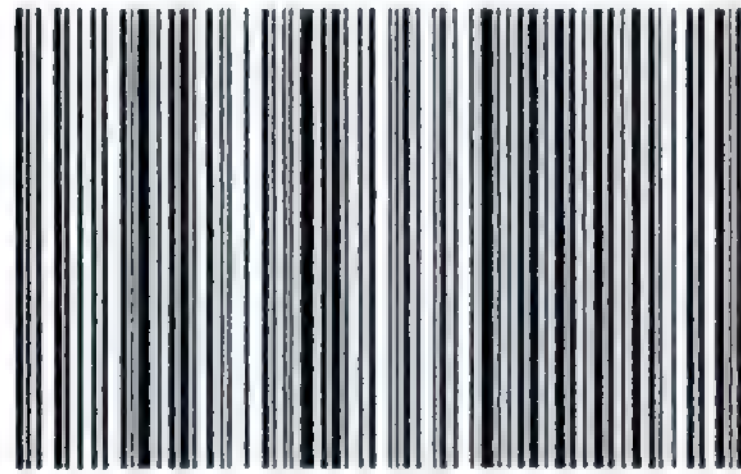
Only \$2195!





1. Open the foldout page
2. Insert this sheet with
 1. Front side touching the free page
 2. Arrow pointing to the fold
3. Slice the folded edge
4. Close the page and slip-sheet

Inverted Foldout slip-sheet

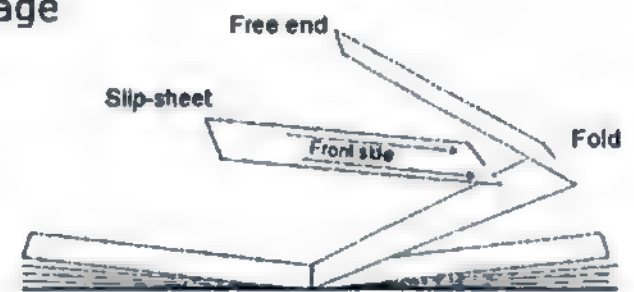


GbsSlipSheet-001

Folded edge of the page

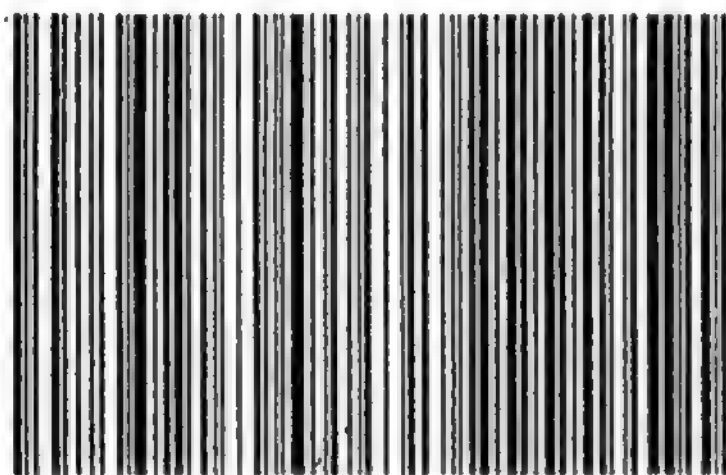
Foldout slip-sheet

1. Open the foldout page
2. Insert this sheet with
 1. Front side touching the free page
 2. Arrow pointing to the fold
3. Slice the folded edge
4. Close the page and slip-sheet



1. Follow instructions on the other side

Inverted Back



GbsSlipBack-001B

Back

1. Follow instructions on the other side

ZEOS® Upgradables.

Go ahead and Pick your Power! ZEOS gives you more '486 options than ever before—all at great new prices. Check it out!

Start by taking a look at the 486SX-25. It's like owning a 486DX without the built-in math coprocessor. Or, if it's full-blown DX power you want, opt for an Editors' Choice 486DX-33. Called "the ultimate power-desktop PC" by *PC Magazine*, there is nothing else like the ZEOS 486DX-33.

But if you're hungering for even more power, take either the ZEOS 486DX2-50 or now the new 486DX2-66!

Absolutely unbelievable performance. And the price?

That's what's really unbelievable. 66MHz power starts at only \$2195. Amazing.

AND THAT'S JUST FOR STARTERS.

ZEOS combines the high-speed upgradable processor of your choice with some of the fastest DRAM made. Both are mounted on your ZEOS system board, one of the most advanced in the industry. And that's where your new system really begins to shine.

Because to this we add an incredibly fast IDE hard drive and genuine Teac® floppy drives. We've located the ports for

these drives right on the motherboard along with your serial and parallel ports. The result?



Two slots are saved, giving your system a total of *seven*. All this—while others are trying to get you to accept fewer slots. With ZEOS, you're getting the expansion advantage. The

slots to expand, how about the room?

This is where ZEOS has performed something akin to magic. We call it our SpaceSaver case. Complete with seven drive bays, this incredible case is actually smaller than many cases offering only five drive bays. Plus, we've added a

second whisper-quiet cooling fan.

Why? Because the cooler a system

runs, the longer it will last.

Your new ZEOS system is absolutely loaded with valuable features. Like our high-capacity power supply with *built-in surge suppression*. And, every ZEOS system—not just the power supply—is UL® listed. And don't forget, you're also getting 24-Hour-A-Day Toll-Free Technical Support, our 30-Day

Absolute Satisfaction Money-Back Guarantee, Express Parts Replacement and more.

So go ahead. Pick your Power, your Package and your Price and give us a call. Your friendly,

expert ZEOS Systems Consultant is ready to answer any questions you may have. *Call now toll free: 800-423-5891.*

486 Power.

New Low Prices.

Loaded!

Computers Now! SM

Take Your Pick. We'll Ship Today!



RIGHT NOW. GUARANTEED!*

Yes, we
can ship
your new
ZEOS '486
today! We've

built up an extra supply of
the hottest selling computers
in America in their most
popular configurations.

Here's how it works. We have
these incredible ZEOS '486
color VGA systems pre-built
and ready to ship. While sup-
plies last, we will ship any of
these systems to you *the day you*
order subject to these conditions:

1. Your order must be received
by 1PM Central Time M-F.
2. Credit Cards are subject to
authorization.
3. Orders must be for ZEOS
'486 systems configured
as shown here. Any other
systems or upgrades are
custom-built and will take
slightly longer.

*OUR GUARANTEE TO YOU:

If we accept your order for

immediate shipment and
fail to ship your system under
the conditions outlined, we
will ship it at *our expense* as
soon as it is ready.

This offer is good only as
long as these pre-built systems
remain in stock; please give
us a call to verify availability.
This offer does not apply to
other ZEOS systems or custom
configurations.

IMMEDIATE SHIPMENT IS ONLY PART OF THE STORY.

These are not just any com-
puter systems. They're the
high performance, high quality
ZEOS systems. Packing all
the ZEOS value that has won
PC Magazine Editors' Choice—
nine times!

So why not give us a call
right now. If we hear from you
by 1:00 this afternoon, we'll
get your new system on the
way to
you today!
Call now
Toll Free
800-423-
5891.



486DX-33 \$2595
486DX2-50 \$2795

- Upgradable CPU allows
you to change processors
as your computing needs
change!
- 128K SRAM cache.
- 4MB of zero-wait DRAM.
- Ultra-fast 130MB IDE hard
drive.
- 1.2MB and 1.44MB Teac
floppies.
- ZEOS 14" high-res 1024x768
non-interlaced VGA color
monitor with Tilt/Swivel
base.
- Diamond SpeedStar 24X
VGA accelerator card/1MB
RAM. 16 million colors.
Halo Desktop Imager
software!
- Microsoft Mouse, Microsoft
Windows and DOS, plus 2 out
of 3 Windows applications:
Lotus 1-2-3, Ami Pro, and
Freelance Graphics!
- ZEOS/RS 101-key
SpaceSaver keyboard.
- High-speed ZEOS I/O with
two serial, one parallel &
one game port built in.
- 7-16, 1-8 bit expansion slots.
- Rugged ZEOS SpaceSaver
case with two cooling fans
for added reliability and
product life.
- Seven drive bays and our
high-capacity power supply.
- Includes ZEOS 24-Hour-
a-Day Toll-Free Technical
Support and Customer
Satisfaction package.

ORDER NOW TOLL FREE
800-423-5891

Fax Orders: 612-633-1325
Government: 800-245-2449
TDD Orders: 800-228-5389
Outside U.S. and Canada:
612-633-6131
MasterCard, VISA, Am Exp,
Discover, Z-Card™, COD and
Leasing programs.
GSA #GS00K91AGS3176
Open 24 Hours a Day,
365 Days a Year!



Purchase orders from Fortune 1000 companies, governments and institutions subject to approval.
Leasing programs available. All prices and specifications subject to change without notice. Please
call to confirm pricing, specification and warranty details. The following are trademarks of their
respective corporations: Microsoft, MS-DOS and Windows of Microsoft Corporation, ZEOS,
Computers Now!, SpaceSaver, SuperCase and Z-Card of ZEOS International Ltd. ©1992
ZEOS International Ltd., 530 5th Avenue, N.W., St. Paul, MN 55112 USA. ZEOS is a publicly
traded company, NASDAQ symbol: ZEOS. Lotus
is a registered trademark of Lotus Development
Corporation. Ami Pro is a trademark of Samna
Corporation, a wholly-owned subsidiary of
Lotus Development Corporation.
UPGR8P-PCM 920929

Circle 151 on reader service card.

A. YOUR PERSONAL INFORMATION

Please complete all appropriate sections, *providing at least two years residence and employment history. THIS IS NOT A CREDIT AGREEMENT!* One will be sent to you upon authorization of an account. (This form must be signed to process your application.) All financed purchases are subject to credit approval. *If you have any credit questions, please call 800-421-8942 for assistance.* Thank you!

Name _____ Previous Address _____
Home Phone (____) _____ City _____ State _____ Zip _____
Soc. Sec. No. _____ Date of Birth ____/____/____ Employer _____ Since? (Mo./Yr.) _____
Address _____ Apt. _____ Monthly Gross Salary \$ _____ Daytime Bus. Phone (____) _____
City _____ State _____ Zip _____ Previous Employer _____ From _____ To _____
Since? (Mo./Yr.) _____ ☐ Buy ☐ Rent ☐ Other _____ Occupation _____

A married person may apply for individual credit. I am applying for (please check appropriate box):

☐ **JOINT CREDIT** with another person. Complete entire application.

☐ **INDIVIDUAL CREDIT** but rely on income or assets of another person as a basis for repaying the credit requested. Complete entire application.

☐ **INDIVIDUAL CREDIT.** Do not complete section C.**

** If you are a married Wisconsin applicant, you must provide your spouse's information as indicated, even though your spouse may not be signing the contract.

NOTICE TO WISCONSIN APPLICANTS:
YOU MUST DISCLOSE YOUR MARITAL STATUS:
☐ married ☐ unmarried ☐ legally separated

Income from alimony, child support or separate maintenance payments need not be disclosed if you do not wish to have it considered as basis for repaying this obligation.

Additional Monthly Income \$ _____ Source: _____

Name & Address of Nearest Relative Not Living With You _____

Relationship _____

B. CREDIT INFORMATION

PLEASE TELL US IF YOU HAVE A:

Checking Account ☐ Yes ☐ No
Savings Account ☐ Yes ☐ No

Y/N How Many?

Y/N How Many?

Bank Loan _____ Dept Store Charge Card _____

VISA _____ Credit Union Account _____

MasterCard _____ Other Major Charge Cards _____

Finance Company Loan _____

C. JOINT APPLICANT INFORMATION

Joint Applicant's Name _____

Soc. Sec. No. _____ Date of Birth ____/____/____

Address _____ Apt. _____

City _____ State _____ Zip _____

Home Phone (____) _____ Date of Residence (Mo./Yr.) _____

Joint Applicant's Employer _____ Since? (Mo./Yr.) _____

Bus. Phone (____) _____ Monthly Gross Salary \$ _____

CUSTOMER AUTHORIZATION

I authorize ZEOS International, Ltd. or its assignees to investigate credit records and to report my performance hereunder to credit agencies. I hereby certify that the following information is furnished to you for the purpose of obtaining credit and is true and correct to the best of my knowledge and belief.

Applicant's Signature _____ Date _____

Joint Applicant's Signature _____ Date _____

FOR MARRIED WISCONSIN APPLICANTS: I acknowledge that the obligation described herein is being incurred in the interest of my marriage or family.

Buyer's Signature _____ Date _____

There are costs associated with the use of this credit card. To obtain more information about these costs, call us at 800-421-8942 or 612-633-0613 or write to ZEOS, Z-Card Processing Center, 530 5th Avenue N.W., St. Paul, MN 55112.

NY-A consumer credit report may be requested in connection with this application or in connection with updates, renewals or extensions of any credit granted as a result of this application. If I subsequently ask for this information, I will be informed whether or not such a report was requested and, if so, the name and address of the agency that furnished the report.

OH-The Ohio laws against discrimination require that all creditors make credit equally available to all creditworthy customers and that credit reporting agencies maintain separate credit histories on each individual upon request. The Ohio Civil Rights Commission administers compliance with this law.

*Financing not available in Alaska, Hawaii or outside the continental U.S.

ZCDJT-PCM-920929

Z-CARD PRIORITY APPLICATION FAX NUMBER: 612-633-7507

Apply for your own Z-Card today!

Z-Card 
12345-67890-12345

YOUR NAME HERE

EXP 01/93

Here's another great reason to buy a ZEOS system: the Z-Card™! The Z-Card works just like a MasterCard or VISA—so you can charge your ZEOS purchases and pay in easy monthly installments. And since no down payment is required, it makes buying your new ZEOS system easier than ever!

You can apply for your very own Z-Card and low, low monthly payments right now. Simply fill out this application and fax it to 612-633-7507. Or mail it to ZEOS International, Z-Card Processing Center, 530 5th Ave. NW, St. Paul, MN 55112. We'll contact you as soon as your credit line is established, usually within 24 hours of receipt. Apply today!

Windows Desktop Managers

9. A script command for switching to a particular virtual desk can be attached to keys or buttons on a toolbar.

A schedule module lets you execute an enhanced command and/or sound an alarm at a specified time. Power Launcher can also use Windows 3.1's Object Linking and Embedding abilities to link to enhanced commands from within any OLE-capable application.

POWER KEYS

The keyboard module lets you assign enhanced commands to any keystroke. Such commands may be either global or specific to an application. While you can record enhanced commands, it is awkward to do this on the fly, so such macros are best suited for permanent use. Similarly, there are modules that assign scripts to mouse buttons and create floating button bars. All have easy-to-use visual interfaces.

Power Launcher does have a few glitches. Even though enhanced commands are easy to set up, their arcane syntax makes them difficult to edit. If you try to change the icon of a DOS application,

in the effort to define your Power Launcher scripts, you will find that nothing else comes close to giving you so much customizability for such a small investment of time.

Abacist Software Co.

HotWin

BY EDWARD MENDELSON

If you want to control Windows from a menu program that is lean, fast, and powerful and lets you run anything with a keystroke, Abacist Software Co.'s \$99 HotWin, Version 2.0a, is exactly what you need. HotWin lets you use hotkeys to jump to and from full-screen DOS applications as well as to and from Windows applications. Its pop-up text-only menu can include up to 20 items, with up to 10 submenus. You can use hotkeys or menus to launch programs, manage the desktop, change printer orientation, switch to any of nine virtual desktops, open a file viewer, and do other complicated tasks instantly. If you want, you can use hotkeys for entirely different functions from menu items.

An installation option lets you import Program Manager groups as menu items, but you can customize the menu and everything else in HotWin. You can choose whether Ctrl-Esc brings up the Windows Task List or any of HotWin's four built-in menus of running applications. You can decide whether a hotkey launches a program a second time if the program is already running or whether it simply brings

SUITABILITY TO TASK				
HotWin				
	POOR	FAIR	GOOD	EXCELLENT
Customizing desktop				
Managing files				
Automating work flow	N/A			
Controlling environment				



FACT FILE

HotWin, Version 2.0a

Abacist Software Co., 5580 La Jolla Blvd., #340, La Jolla, CA 92037; 800-729-3597, 619-488-3929; fax, 619-483-9713

List Price: \$99.

Requires: Windows 3.0 or later.

In Short: This is a lean, flexible, and powerful menu and hotkey program that supplements or replaces Program Manager. It offers thorough control over Windows from the keyboard, with quick access to many convenience features. It is a pleasure to configure and use.

ON READER SERVICE CARD

the running program to the top of the Windows desktop.

YOU'RE THE PILOT

HotWin's program-launching menus give you more control than you get in Windows' Program Manager, but it doesn't give you quite as much control as the more visually striking hDC Power Launcher. You can launch programs into the current screen or any other virtual screen, and an optional pop-up box lets you enter a parameter or find a file. You can specify a program that automatically becomes active when all other programs are closed and that minimizes when you run any other program. The run box remembers your last 20 commands.

The simple file manager/viewer will not let you display more than one directory at a time or delete or copy multiple files, but it's impressively fast. You can switch among HotWin's virtual desktops from the menu, either by hotkeys or by clicking the right mouse but-



FACT FILE

hDC Power Launcher, Version 2.0

hDC Computer Corp., 6742 185th Ave. NE, Redmond, WA 98052; 800-321-4606, 206-885-5550; fax, 206-881-9770

List Price: \$99.95; upgrade from Version 1.0, \$19.95.

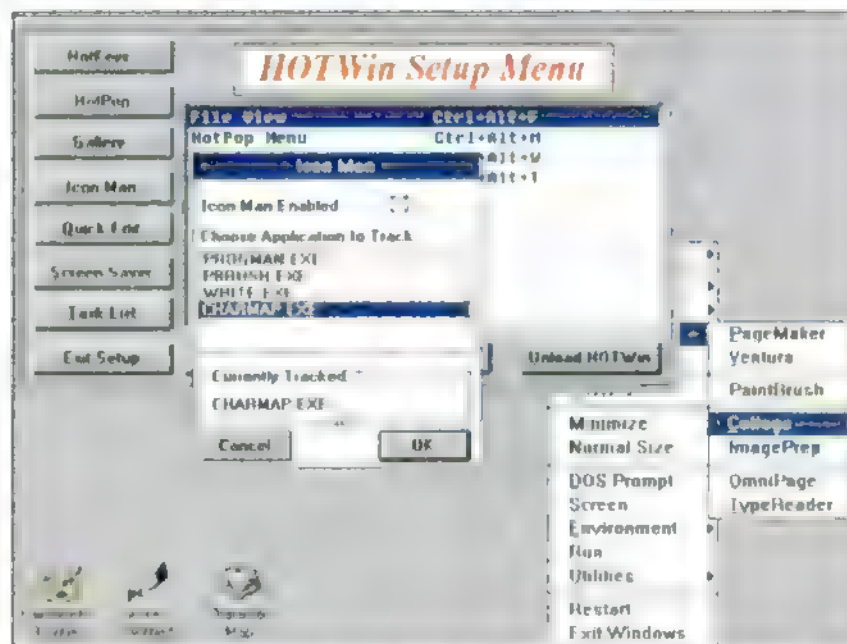
Requires: Windows 3.0 or later.

In Short: hDC Power Launcher gives you tremendous control over your Windows environment with enhanced commands you can type in, build in a dialog, or assign to menus, keys, mouse clicks, or floating toolbars.

ON READER SERVICE CARD

Power Launcher will change the icon for all running DOS applications. Also, the quality of the sounds leaves something to be desired. Finally, Power Launcher rudely plasters its icon on top of your system menu button. While you can turn this "feature" off, the icon is permanently displayed on the side of the Power Bar.

These irritations aside, Power Launcher can be a power user's dream. It can replace or supplement Program Manager, The Norton Desktop for Windows, or any other shell. If you are willing to put



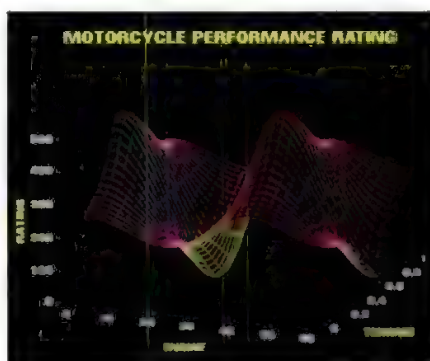
HotWin's setup menu gives you easy access to all features and lets you ignore the ones you do not need. Here, HotWin is being told which program to restore to normal size when all the other programs are closed. A typical HotWin pop-up menu is at the lower right side of the screen.



We've Added Extra Power To An Already Great Ride. New STATGRAPHICS *Plus* Takes You Farther.

**YOU DON'T HAVE TO BE
AN EXPERT TO HANDLE
NEW STATGRAPHICS *Plus*
FOR THE 386/486.**

If you've been wheeling around statistics for any time at all, you probably already know about STATGRAPHICS®, the statistical graphics system that anyone can use to quickly analyze data and *see* the results. The package that offers over 250 different statistical procedures, including regression analysis, ANOVA, quality control, experimental design, multivariate methods, forecasting, and much more. The product that Software Digest rated #1 for ease of use and learning. Now, we've done the only thing left to improve it: we've added all the horsepower you could want.



THE POWER AND SPEED FOR THE FAST TRACK.

If you've got a 386- or 486-based PC, grab your racing helmet. Because anything STATGRAPHICS can do, STATGRAPHICS *Plus* can do up to 5 times faster. And since it utilizes all of the RAM in your computer, it can handle the largest problems, including those that other stat packages

choke on. And everything in this powerful new product works just like in STATGRAPHICS, right down to its easy-to-use menus and ability to import data from Lotus®, dBASE®, ASCII, or DIF files.

THINK OF IT AS A BETTER WAY TO SEE THE BIG PICTURE, FASTER.

Call today for more information and a free demo disk. And let STATGRAPHICS *Plus* keep you from spinning your wheels waiting for solutions.

STATGRAPHICS

In Maryland, (301) 984-5123.
Outside the U.S., (301) 984-5412.

(800) 592-0050 Ext. 200

► SUMMARY OF FEATURES

Windows Desktop Managers



Products listed in alphabetical order

■ = YES □ = NO

	Microsoft Windows 3.1*	Amish Utilities for Windows	AniTools	BackDesk	BeckerTools	Direct Access Windows	File Commander	hDC Power Launcher
List price	\$149.95	\$99.00	\$99.95	\$66.50	\$129.95	\$99.00	\$49.95	\$99.95
Program Launching								
Can read Program Manager groups	■	□	■	■	□	■	□	■
Reads Program Manager groups each time it loads	■	□	■	■	□	□	□	□
Has accessible task list	■	□	□	□	□	■	□	■
Has auto-start group or script	■	■	□	■	□	■	■	■
Allows subgroups within groups	□	■	□	■	□	■	■	■
Allows working directory different from program directory	■	■	■	■	□	■	■	■
Can launch minimized programs	■	■	■	■	□	■	■	■
Can adjust window position and size after launching	■	■	□	□	□	□	■	■
Can query for filename with file list shown on launch	□	□	□	■	□	□	■	■
Launches program with hotkey	□	■	□	□	□	□	□	■
Launches program from menu	□	■	■	■	□	■	■	■
Launches multiple applications with single command or icon	□	□	□	□	□	□	■	■
Launches file types via associations from file list	■	■	■	□	■	□	■	■
Assigns desktop icons for DOS programs	■	□	□	□	□	□	□	■
Places unopened programs on desktop	□	□	□	□	□	□	□	□
View of launch groups:								
Button bar	□	□	■	□	□	□	□	■
Icon	■	□	□	□	□	□	□	□
Text list	□	■	■	■	□	■	■	■
Can drag and drop items between groups	■	□	□	□	□	□	□	□
Password protection of individual groups	□	□	□	□	□	■	■	□
File Management								
Basic file management (copy, delete, rename)	■	■	■	□	■	□	■	■
Changes file attributes	■	■	■	□	■	□	■	□
Moves files on same drive	■	■	■	□	■	□	■	■
Moves files between drives	■	■	■	□	■	□	■	■
Supports file copying/moving by dragging	■ ■	□ □	■ ■	□ □	■ ■	□ □	■ ■	□ □
Creates and removes directories	■	■	■	□	■	□	■	■
Moves directories on same drive (prunes and grafts)	■	■	■	□	■	□	□	■
Moves directories between drives	■	■	■	□	■	□	□	■
Formats floppy disks	■	□	□	□	■	□	□	□
Can erase files by overwriting (shreds or zaps)	□	□	□	□	□	□	□	□
Can unerase	■	□	□	□	■	□	□	□
Compares files	□	□	□	□	□	□	□	□
Finds duplicate files	■	□	□	□	□	□	□	□
Displays linked directory tree and file list	■	■	■	□	■	□	■	■
Displays multiple directory trees	□	□	■	□	■	□	■	□
Maximum number of directory trees	N/A	N/A	6	N/A	2	N/A	Unlimited	N/A
File display filter based on attributes	□	□	□	□	■	□	□	□

* Reported for comparison. N/A—Not applicable: The product does not have this feature.

Windows Desktop Managers

FACT FILE

K-U-I, Version 1.0

Softac Corp., 23 Sunset Rd., Winchester,
MA 01890; 800-433-0486, 617-721-1010;
fax, 617-721-2590

List Price: \$79.95.

Requires: Windows 3.0 or later.

In Short: This is an effective keyboard interface for Windows that even lets you do away with the mouse. It is a supplement to Program Manager that gives you hotkeys to virtually any application or file you choose, with additional hotkeys for other controls over the display. This product is not as extensive as HotWin, but it has some unique features, including a command line that gives immediate access to DOS or Windows commands.

 ON READER SERVICE CARD

PC EDITORS
CHOICE

HotWin

\$99.00

K-U-I

\$79.95

PC EDITORS
CHOICEMETZ Task
Manager

\$49.95

ton on the empty desktop. The manual does not mention that you can use HotWin as a replacement Windows shell, with a desktop that's absolutely blank until you pop up the menu.

HotWin does some things as well as hDC Power Launcher, but it does not share its range of features. Still, HotWin is more willing to stay out of your way when you don't need it, and it offers a unique combination of conveniences. Nothing else gives you so much power over Windows in a package as compact and well-designed as HotWin.

Softac Corp.

K-U-I

BY EDWARD MENDELSON

Softac Corp.'s \$79.95 K-U-I, the Keyboard User Interface for Windows 3.0, Version 1.0, is the Windows interface for people who prefer DOS and the keyboard to Windows and the mouse. K-U-I supplements Program Manager with hotkeys and shortcut keys for quick access to applications or files from any-

SUITABILITY TO TASK**K-U-I**

	POOR	FAIR	GOOD	EXCELLENT
Customizing desktop	●	●	○	○
Managing files	N/A			
Automating work flow	N/A			
Controlling environment	●	●	○	○

where, including DOS windows. A pop-up command line gives you instant access to all Windows or DOS commands, so you can use DOS's copy and delete commands without going to the trouble of opening a DOS session first.

At the core of K-U-I is a hotkey definition screen and control center called Instant HotKey. You can add or alter the supplied hotkeys either from a menu or simply by running an application and pressing a key that defines the next key you press as a hotkey for loading or switching to the application—and the file now loaded into it. This procedure won't work if the file is loaded from a directory other than the application's start-up directory, but you can edit the hotkey definition to include a path. Other shortcuts and hotkeys let you iconize or terminate

all programs from K-U-I's replacement task list or cycle through minimized, maximized, or iconized states of the current window.

K-U-I's command line automatically opens a DOS window when you enter any DOS command or program name. It also works with 4DOS and NDOS aliases (although not with PCED synonyms). You can create one-word K-U-I aliases that run any complex DOS or Windows command line, and you can specify that an application start in a directory other than its own. A file-finding module lets you transfer filenames to the command line. It also lets you change the current path.

Laptop users will value a customizable mouse-simulation mode that uses the arrow keys to move the cursor and the Insert key as the equivalent of a click. You can also switch to an enlarged or black cursor for better visibility. A pop-up magnifier gives you a close-up view of the area around the cursor.

You can use ordinary Windows functions to do most of the things that K-U-I does, but K-U-I lets you do them faster, with fewer keystrokes, and, if you prefer, without a mouse.

METZ Software Inc.

METZ Task Manager

BY BARRY SIMON

What could be handier than replacing Windows' Task Manager with a single control center that handles file launching

CONTINUES

Client/server.



Is it real productivity, or

Everybody's talking about client/server, but if you ask ten people what it means, that's about how many different answers you'll get back.

So for IBM, a simple definition works best. To us, client/server is any combination of systems that can cooperate to give people all the information they need, without their having to care where it comes from.

Client/server can be as basic as a network of PCs, or it can span continents, with PCs, RISC boxes, midranges and mainframes all playing different roles—some as clients, some as servers, some as both.

But the trick is for everything to work together, with each part doing what it does best. And yes, it *really*



just a buzzword?

can work; paying big dividends—in happier users and leaps in performance—often from existing equipment.

So is client/server the private turf of a particular vendor? Or operating system? Or server architecture? Of course not. Cross-platform experience is essential to client/server, and that's where IBM can help you, probably better than anyone.

Look at any IBM product line and you'll see client/server written all over it. From PS/2®s to AS/400®s to ES/9000™s, we've opened our systems to each other and to standards shared by other vendors.

For example, at ICOS Corp., a Seattle biopharmaceutical company, we built a system of Mac®s and

PS/2s connected through Ethernet and Token-Ring to an IBM RISC System/6000™ server. The system meets everyone's needs, from DNA analysts to bookkeepers.

CIGNA's Direct Marketing Division uses PS/2s tied to local OS/2® servers and mainframes. The application runs cooperatively across all platforms, data is stored in LAN and host servers, and PS/2s display GUI screens.

In both cases, users are experiencing new levels of productivity. But the one thing they never see is their systems' complexity.

To learn more, see an IBM marketing rep. Or, to have one call you, call 1 800 IBM-6676, ext. 770.



COVER STORY
Windows Desktop Managers

► **S U M M A R Y O F F E A T U R E S**

Products listed in a phabetical order PC EDITORS' CHOICE								
■ = YES □ = NO	NewWave	The Norton Desktop for Windows	Ready, Aim, FILE! for Windows	Salvation	Sloop Manager	SmartPad for Windows	Squeegee	Synergy
List price	\$195.00	\$179.00	\$59.95	\$69.95	\$35.00	\$60.00	\$79.95	\$129.95
Program Launching								
Can read Program Manager groups	■	■	□	■	■	□	■	■
Reads Program Manager groups each time it loads	□	□	□	□	□	□	■	□
Has accessible task list	□	■	□	□	□	□	■	□
Has auto-start group or script	■	■	□	■	■	□	■	□
Allows subgroups within groups	■	■	□	□	■	■	■	■
Allows working directory different from program directory	■	■	■	■	■	■	■	■
Can launch minimized programs	■	■	□	■	■	■	■	■
Can adjust window position and size after launching	■	□	□	■	□	□	□	□
Can query for filename with file list shown on launch	□	□	□	□	□	■	□	□
Launches program with hotkey	□	■	□	■	□	■	■	□
Launches program from menu	■	■	■	■	■	□	■	■
Launches multiple applications with single command or icon	■	□	□	□	□	■	■	■
Launches file types via associations from file list	■	■	■	■	■	■	■	■
Assigns desktop icons for DOS programs	■	■	□	□	□	□	□	□
Places unopened programs on desktop	■	■	□	□	□	■	□	■
View of launch groups:								
Button bar	□	■	□	■	□	■	□	■
Icon	■	■	□	□	■	□	□	□
Text list	■	■	■	□	■	□	■	■
Can drag and drop items between groups	■	■	□	□	■	□	□	■
Password protection of individual groups	□	■	□	□	■	□	□	□
File Management								
Basic file management (copy, delete, rename)	□	■	■	■	□	□	■	□
Changes file attributes	□	■	□	■	□	□	□	□
Moves files on same drive	□	■	■	■	□	□	■	□
Moves files between drives	□	■	■	□	□	□	■	□
Supports file copying/moving by dragging	□□	■■	■□	□□	□□	□□	□□	□□
Creates and removes directories	□	■	■	■	□	□	■	□
Moves directories on same drive (prunes and grafts)	□	■	□	■	□	□	■	□
Moves directories between drives	□	■	□	□	□	□	■	□
Formats floppy disks	□	■	□	■	□	□	□	□
Can erase files by overwriting (shreds or zaps)	□	■	□	□	□	□	□	□
Can unerase	□	■	□	□	□	□	□	□
Compares files	□	□	□	■	□	□	□	□
Finds duplicate files	□	□	□	□	□	□	□	□
Displays linked directory tree and file list	□	■	□	□	□	□	□	□
Displays multiple directory trees	□	■	■	□	□	□	□	□
Maximum number of directory trees	N/A	Unlimited	2	N/A	N/A	N/A	N/A	N/A
File display filter based on attributes	□	■	□	□	□	□	□	□
N/A—Not applicable: The product does not have this feature								

Windows Desktop Managers

	WinEZ Pro	WinTools
	\$39.95	\$149.00

	■	■
	■	□
	■	■
	□	■
	□	■
	■	■
	■	■
	□	■
	□	□
	□	□
	■	□
	■	■
	□	■
	□	■
	□	■
	■	■
	□	■
	■	■
	□	■
	□	■

	□	■
	□	■
	□	■
	□	■
	□□	■
	□	■
	□	■
	□	■
	□	□
	□	□
	□	□
	□	■
	□	■
	□	■
	□	■
	N/A	Unlimited
	□	■

CONTINUES



The METZ Task Manager window displays a drop-down list from which you choose Task List or a Program Manager group, a scrolling list, launch buttons, window-control buttons, a quick launchpad, a run dialog including a drop-down history list, and a status line.

and management as well as task switching? That's exactly what the \$49.95 METZ Task Manager, Version 2.0, does, popping up when needed at the click of a mouse or the touch of hotkey.

SUITABILITY TO TASK

METZ Task Manager

	POOR	FAIR	GOOD	EXCELLENT
Customizing desktop	●	●	●	○
Managing files	●	○	○	○
Automating work flow	●	●	○	○
Controlling environment	●	●	○	○

The METZ Task Manager window packs a tremendous amount of functionality into a piece of real estate roughly twice the size of Windows' Task Manager window. Here is a rundown of the screen elements. Surmounting the main window is a master drop-down menu. Immediately beneath this is a bar containing a pull-down pick list of program groups and an array of five icon buttons that access file management operations, a quick search function, and a system-status monitor. The left-hand portion of the main window area is devoted to displaying a list of the contents of the selected program group; the right-hand side contains 15 instant-access buttons divided into two groups—6 that control the screen display and 9 for one-click program launching. Below this is a bar containing a run box with a history list. At the very bottom of this window are panels that display the current date and time,

the size of available system memory, and the percentage of memory in use.

THREEFOLD PATH

There are three ways to launch programs from METZ Task Manager. One way is to invoke the drop-down list above the task list, pick any Program Manager group name, and get a list of the items in that group to launch. A second option uses the "launchpad," which consists of nine iconic buttons located on the right side of the main METZ Task Manager window. You set up these buttons by dragging and dropping from the program listings in the left-hand

window. I only wish there were more than nine buttons! The third method is via the menu that appears in the main METZ Task Manager window, which you can configure to be multilevel. Better yet, you can also place this launch menu in Windows' File Manager. Then you can select several files and open an application from the launch menu with all those files loaded!

You can further assign any launch-menu or launchpad item to a hotkey. By assigning several programs to the same hotkey, you can launch them all at once. These hotkeys even work in full-screen DOS sessions (unlike those in most competitors' products), as long as you load METZ's proprietary device driver in your CONFIG.SYS. The DOS hotkey support is flawed because the keystrokes get passed on to the underlying DOS pro-



FACT FILE

METZ Task Manager, Version 2.0

METZ Software Inc., P.O. Box 6699,
Bellevue, WA 98008; 800-447-1712,
206-641-4525; fax, 206-644-6026

List Price: \$49.95; upgrade from any METZ product, \$19.95.

Requires: Windows 3.0 or later.

In Short: This powerful replacement for the Windows Task Manager gives you a quick launchpad, quick access to Program Manager groups, and a simple file manager.

ON READER SERVICE CARD

► SUMMARY OF FEATURES

Products listed in alphabetical order



■ = YES □ = NO

Microsoft
Windows 3.1*Amish
Utilities for
Windows

AttiTools

BackDesk

BeckerTools

Direct Access
WindowsFile
CommanderhDC Power
Launcher

File Management (continued)

File display filter based on date or time	☐	☐	☒	☐	☒	☐	☐	☐
Allows selection of noncontiguous multiple files	☒	☒	☒	☐	☒	☐	☐	☐
Allows selection based on file types	☒	☐	☒	☐	☒	☐	☐	☐
Sorts by name	☒	☒	☒	☐	☒	☐	☐	☐
Sorts by extension	☒	☒	☒	☐	☒	☐	☐	☐
Sorts by date and time	☒	☒	☒	☐	☒	☐	☐	☐
Displays total file size for entire directory	☒	☒	☒	☐	☒	☐	☐	☐
Displays free space for drive	☒	☒	☒	☐	☒	☐	☐	☒
Can paste filename or path to Clipboard	☐	☒	☐	☐	☐	☐	☐	☐
Distinguishes network and CD-ROM drives	☒	☐	☐	☐	☐	☐	☐	☐
Works properly with SUBST drives	☐	☐	☒	☐	☐	☐	☐	☐
Gives warning on copy overwrite	☒	☒	☐	☐	☒	☐	☒	☐
Number of text format viewers	None	1	5	None	1	None	1	None
Number of graphics format viewers	None	None	10	None	7	None	None	None
Number of spreadsheet format viewers	None	None	2	None	None	None	None	None
Number of database format viewers	None	None	1	None	None	None	None	None
Hex viewer	☐	☒	☐	☐	☒	☐	☒	☐
Zip directory viewer	☐	☐	☐	☐	☐	☐	☐	☐
Searches for files by name on single/multiple drives	☒ ☒	☐ ☐	☒ ☒	☐ ☐	☒ ☐	☐ ☐	☐ ☐	☐ ☐
Moves and copies files found by a search	☒	☐	☒	☐	☒	☐	☐	☐
Text search	☐	☐	☒	☐	☒	☐	☐	☐
Prints files	☒	☐	☒	☐	☒	☐	☐	☒
Prints files in native application	☒	☐	☐	☐	☐	☐	☐	☒

Desktop Customization

Can tile and cascade open programs	☒	☒	☐	☐	☐	☐	☒	☒
Can minimize all open programs	☐	☐	☐	☐	☐	☐	☐	☒
Can close all open programs	☐	☐	☐	☐	☐	☐	☐	☒
Can exit Windows	☒	☒	☐	☒	☐	☒	☒	☒
Number of virtual desktops	None	64	None	64	None	None	None	64
Can preserve and reopen desktop arrangement	☒	☐	☐	☐	☐	☐	☐	☐
Number of screen savers	5	None	None	None	7	None	None	3
Icon editor	☐	☐	☐	☐	☐	☒	☐	☐
Number of icons included	375	None	None	None	None	269	None	31

Work Flow Automation

User can hotkey between Windows applications	☒	☐	☐	☐	☐	☐	☐	☒
User can hotkey between full-screen DOS applications	☒	☐	☐	☐	☐	☐	☐	☐
User can hotkey between virtual desks	☐	☐	☐	☐	☐	☐	☐	☒
Scripts (or macros):								
Records scripts	☒	☐	☐	☐	☐	☐	☐	☒
Includes script editor	☐	☐	☐	☐	☐	☒	☒	☒
Branching (if-then) in scripts	☐	☐	☐	☐	☐	☒	☒	☐
Variables in scripts	☐	☐	☐	☐	☐	☒	☒	☐

* Reported for comparison

METZ Task Manager is a powerful superset of Windows' Task Manager, and it will be exceedingly useful to any Windows user who wants to combine the power of Task Manager, Program Manager, and File Manager in one easy-to-use pop-up window.

New Wave

Hewlett-Packard has positioned NewWave as a Windows desktop manager similar in scope and features to The Norton Desktop for Windows, but the actual overlap in concept and features between the two is quite small.

POOR FAIR GOOD EXCELLENT

Customizing desktop				
Managing files				
Automating work flow				
Controlling environment				

When you install NewWave, information about all of your DOS and Windows productivity applications is stored in a hidden set of "object templates." To start an application for the first time under NewWave, you must first create an object using NewWave's pull-down menu system. When you select Create New Object, NewWave displays a dialog box containing all of the object templates for installed applications. You select the appropriate template for the desired application and specify a name for the new object. This places an object icon on the NewWave desktop. Next time you click on the object, NewWave runs its application, automatically opening an associated document that bears the object's name. In this

[illegible]

NewWave's Agent script language allows you to program and display your own custom menus, such as the application launch menu shown here along with the Agent script that was used to create it.

Windows Desktop Managers

► SUMMARY OF FEATURES

								
Products listed in alphabetical order	NewWave	The Norton Desktop for Windows	Ready, Aim, FILE! for Windows	Salvation	Sloop Manager	SmartPad for Windows	Squeegee	Synergy
■ = YES □ = NO								
File Management (continued)								
File display filter based on date or time	☐	☒	☐	☐	☐	☐	☒	☐
Allows selection of noncontiguous multiple files	☐	☒	☒	☒	☐	☐	☒	☐
Allows selection based on file types	☐	☒	☐	☒	☐	☐	☐	☐
Sorts by name	☐	☒	☒	☒	☐	☐	☒	☐
Sorts by extension	☐	☒	☒	☒	☐	☐	☒	☐
Sorts by date and time	☐	☒	☒	☒	☐	☐	☒	☐
Displays total file size for entire directory	☐	☒	☒	☒	☐	☐	☒	☐
Displays free space for drive	☐	☒	☒	☒	☐	☐	☒	☐
Can paste filename or path to Clipboard	☐	☒	☐	☐	☐	☐	☐	☐
Distinguishes network and CD-ROM drives	☒	☒	☐	☐	☐	☐	☒	☐
Works properly with SUBST drives	☒	☐	☐	☐	☐	☐	☐	☐
Gives warning on copy overwrite	☒	☒	☒	☒	☐	☐	☒	☐
Number of text format viewers	None	8	1	1	None	None	None	None
Number of graphics format viewers	None	20	None	4	None	None	None	None
Number of spreadsheet format viewers	None	7	None	None	None	None	None	None
Number of database format viewers	None	3	None	None	None	None	None	None
Hex viewer	☐	☒	☐	☐	☐	☐	☐	☐
Zip directory viewer	☐	☒	☐	☐	☐	☐	☐	☐
Searches for files by name on single/multiple drives	☐ ☐	☒ ☒	☒ ☒	☐ ☒	☐ ☐	☐ ☐	☒ ☒	☒ ☒
Moves and copies files found by a search	☐	☒	☒	☒	☐	☐	☒	☐
Text search	☐	☒	☐	☐	☐	☐	☒	☐
Prints files	☒	☒	☐	☐	☐	☐	☐	☐
Prints files in native application	☒	☒	☐	☐	☐	☐	☐	☐
Desktop Customization								
Can tile and cascade open programs	☐	☒	☐	☐	☐	☒	☐	☐
Can minimize all open programs	☐	☐	☐	☐	☐	☐	☐	☒
Can close all open programs	☐	☒	☐	☐	☐	☐	☐	☒
Can exit Windows	☒	☐	☐	☒	☐	☒	☒	☒
Number of virtual desktops	None	None	None	None	None	None	None	None
Can preserve and reopen desktop arrangement	☒	☒	☐	☐	☐	☐	☐	☐
Number of screen savers	None	18	None	1	None	None	None	None
Icon editor	☐	☒	☐	☐	☐	☐	☐	☒
Number of icons included	None	350	None	343	40	200	None	100
Work Flow Automation								
User can hotkey between Windows applications	☐	☒	☐	☐	☐	☒	☒	☐
User can hotkey between full-screen DOS applications	☐	☒	☐	☐	☐	☐	☐	☐
User can hotkey between virtual desks	☐	☐	☐	☐	☐	☐	☐	☐
Scripts (or macros):								
Records scripts	☒	☒	☐	☐	☐	☒	☐	☐
Includes script editor	☒	☒	☐	☐	☐	☒	☐	☒
Branching (if-then) in scripts	☒	☒	☐	☐	☐	☐	☐	☒
Variables in scripts	☒	☒	☐	☐	☐	☒	☐	☒

Windows Desktop Managers

FACT FILE

NewWave, Version 4.0

Hewlett-Packard Co., 974 E. Arques Ave.,
Sunnyvale, CA 94086; 800-554-1305

List Price: \$195.

Requires: Windows 3.0 or later.

In Short: NewWave totally redefines the Windows interface with its own object-oriented desktop metaphor. More of an application development environment than a desktop file manager, this package may be overkill for many. In the hands of trained MIS personnel, however, NewWave can be used to build powerful turnkey systems.

 ON READER SERVICE CARD

AUTOTASKING AGENT

NewWave's formidable macro-recording capability allows you to create iconized "tasks" on the desktop that play back a series of keystrokes and/or mouse clicks. Tasks can be executed from a pull-down menu or by dropping a task icon onto the NewWave "Agent." For example, you could retrieve a series of document-objects from a folder to the desktop by dragging a preconfigured "Retrieve" task to the Agent icon. A different type of automated task would be one that accessed Windows' Control Panel and switched printers.

The Agent can also be used to help novices organize information, offering choices for where an object should be stored. NewWave's filing system bypasses the DOS file structure, storing the object as a pointer to any associated files. For example, if you create a document in Ventura Publisher for Windows, NewWave links all of Ventura's relevant text, graphics, and chapter overlays to a single object. If you port the object to another location, all of the associated Windows or DOS files move along with it.

NewWave is designed for easy sharing of information across a network with other NewWave users. Part of a network drive can be set up as an object storage area from which documents can be checked in and out. NewWave keeps track of the relevant DOS pointer information internally, hiding it from the user. (Unfortunately, this feature can be very cumbersome if you need to port a document to a system that isn't running NewWave.)

TO WAVE OR NOT

For those already familiar with the way DOS and Windows do things, learning NewWave may require too much reorientation to be worthwhile. Complete novices may find the project folder and object setup helpful, but they will be at sea when they need to transfer work to a non-NewWave workstation. The Agent script language, while powerful, is arcane. Even professional programmers may need to recompile their scripts several times to get NewWave to do something as simple as pop up a customized program launch menu.

Fundamentally, NewWave is more of an application development interface than a desktop file manager. If you simply want more convenient features with which to customize and control your standard Windows desktop, NewWave is probably not the front end for you. It becomes most useful in the context of MIS (management information systems); in the hands of a trained MIS manager, its power for constructing turnkey systems should not be overlooked.

Symantec Corp.

The Norton Desktop for Windows

BY EDWARD MENDELSON

Windows desktop replacements divide into minimalist shells that launch programs and little more and maximalist programs that let you do anything imaginable with a file, from launching it and editing it to backing it up to destroying it beyond recovery. Symantec Corp.'s \$179 The Norton Desktop for Windows, Version 2.0, is the most maximal shell of all.

This elegant and bounteous package offers a customizable shell with advanced desktop utilities, file finders, and file viewers, plus a backup program, scheduler, batch interpreter, macro recorder, and

SUITABILITY TO TASK**The Norton Desktop for Windows**

	POOR	FAIR	GOOD	EXCELLENT
Customizing desktop	●	●	●	●
Managing files	●	●	●	●
Automating work flow	●	●	●	●
Controlling environment	●	●	●	●

CONTINUES

Now! Northgate® Provides Novell®

How do you know the computer you get is really Novell certified? Typically, if you specify even the slightest deviation from the original certification, Novell no longer recognizes the system as certified.

Northgate knows the importance of Novell certification. That's why we have qualified to self-certify our network servers and workstations.

Northgate can assure you we'll ship your custom-configured, Novell-certified system in as few as four weeks, rather than the several months it takes to be certified at Novell. And, because we do all the lab work, your certified system will very likely cost less.



Self-certification capability is just one more reason why corporations coast-to-coast now rely on Northgate for all their networking needs. Northgate has your solution, too!



Powerful File Servers and Workstations! Select from 386 and 486 file servers, as well as a variety of workstations featuring our popular 386SX/25 systems. All are FCC Class B certified.



Make the Editors' Choice Elegance™ 486/33e The Heart Of Your LAN!

“The Northgate Elegance 433e is a turnkey NetWare® computer with a laudable price...”

“...Northgate gives network administrators everything they need – a turnkey system with hard disks optimized for NetWare, excellent expansion capability and good performance...”

“The Northgate Elegance 433e, with its well-rounded and sensible configuration has it all; a performance/features score that's better than average and a dynamite price which together create a higher-than-average Bang for the Buck score. The server is even Novell certified.”



Certification For Most Configurations!



LAN solutions from the company ranked #1 in customer satisfaction for technical support by *PC Magazine* readers.* Services include technical support 24 hours a day, seven days a week, comprehensive hardware warranties and more. Plus, our technicians are backed by Certified NetWare Engineers. This is your assurance of the best support possible.



Choice of Topologies and Operating Software! Select from ARCNET™, ETHERNET Thin Net, ETHERNET 10BASE-T, Token Ring or wireless LANs. Plus, NetWare® 3.11, 2.2, NetWare Lite® and LANtastic®



Get up to 4GB of fault-tolerant disk storage with the OmniArray parallel disk array. Northgate RAID technology uses four drives plus a fifth parity drive giving you true high disk fault tolerance and high data availability. Novell certified.



486 EISA Speed And Upgradability At Our Lowest Price Ever! Northgate's 486 ZXP EISA workstation is upgradable across the entire range of Intel processors including: 486SX/20, SX/25 DX/33, DX2/50 – even the new DX2/66! Features up to 128 MB RAM, 32-bit EISA controller, EISA bus and more. Call for specs and pricing!

**Call for complete custom configuration information.
800-828-6125**

Major corporations, volume purchasers and government agencies call National Business Accounts: 800-545-6065
GSA# GS00K91AGS5193 PS01

Charge it to your VISA, MasterCard, Discover, American Express and Northgate Big 'N' Card. 12-60 month leasing plans also available.



"When it has to work right"™

7075 Flying Cloud Drive, Eden Prairie, MN 55343

Windows Desktop Managers

► SUMMARY OF FEATURES

Products listed in alphabetical order								
■ = YES □ = NO	Microsoft Windows 3.1*	Amish Utilities for Windows	AttiTools	BackDesk	BeckerTools	Direct Access Windows	File Commander	hDC Power Launcher
Work Flow Automation (continued)								
User input in scripts	□	□	□	□	□	■	■	■
Assigns scripts to hotkeys	■	□	□	□	□	□	□	■
Assigns scripts to mouse actions	□	□	□	□	□	□	□	■
Assigns scripts to icons	□	□	□	□	□	■	□	■
Can schedule one-time events	■	■	□	□	□	□	□	■
Can schedule recurrent events	■	■	□	□	□	□	□	■
Can make Dynamic Data Exchange calls	■	□	□	□	□	□	■	■
Can act as DDE server	■	□	□	□	□	□	□	□
Other Features								
Text editor	■	□	□	□	■	□	□	□
Calculator	■	□	□	□	□	□	□	□
Displays free resources	■	■	□	■	□	■	■	■
Number of .WAV files included	2	None	None	None	None	None	None	None
Backup	□	□	□	□	■	□	□	□
Virus protection	□	□	□	□	□	□	□	□
File compression and decompression	□	□	■	□	□	□	□	□
Disk optimization	□	□	□	□	■	□	□	□
Uninstall module or mode	□	□	□	□	□	□	□	□

* Reported For Comparison

DOS-based recovery and security utilities taken from The Norton Utilities. You may not agree with every detail of the design of The Norton Desktop for Windows (NDW), and you may never use all of it, but it is hard to imagine a Windows user who won't want much of its wealth of features.

The desktop program itself is a unified file-and-program manager that offers a

well-judged balance between object orientation and the traditional file system. The basic screen consists of a set of drive icons, windows containing program groups, and a set of tool icons for printing, backup, viewing, and other functions. If you drag a drive icon to the backup tool, you launch The Norton Backup and back up the drive. Clicking on a drive icon opens a directory window, from which you can view and search files. Dragging filenames from the directory tree—or program icons from the group windows—leaves them available on the desktop for launching or drag-and-drop operations.

MUCH-ACCUSTOMED DESKTOP

This desktop accepts customization to a degree approached only by WinTools. Your program groups can appear as labelled icons in the familiar Program Manager style, lists of names, or icon-only toolboxes. You can also mix any or all of these group styles on the screen at once. Groups can also contain other groups, so

**FACT FILE****The Norton Desktop for Windows, Version 2.0**

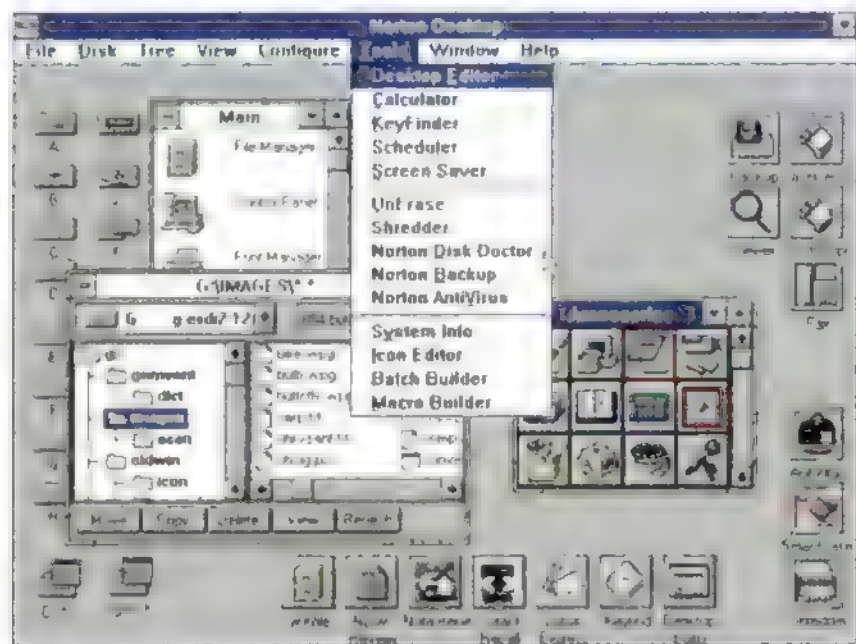
Symantec Corp., 10201 Torre Ave.,
Cupertino, CA 95014; 800-441-7234,
408-252-3570; fax, 408-255-3334

List Price: \$179.

Requires: Windows 3.0 or later.

In Short: A comprehensive desktop replacement combined with a rich, thorough set of well-designed Windows utilities makes this package an extraordinary value. The combined program manager and file manager is exceptionally powerful but may be more than some users need.

ON READER SERVICE CARD



Shown here is The Norton Desktop for Windows desktop in full glory. One group appears in the form of a list; another appears as an icon bar. The fax tool at the upper-right corner represents a Windows fax driver; you can drop a file on the tool to fax it. The drop-down menu can be completely replaced with alternate menus.

Windows Desktop Managers

You can select a permanent directory-display screen font, but the file viewer forgets its screen font between Windows sessions. Additionally, some help buttons summon up error messages instead of explanations.

The smaller components of the package range from excellent to problematic. On the plus side, the screen saver works with modules from Windows 3.1, After Dark 2.0, and Intermission 3.0; the macro recorder creates editable macros that can be inserted into Windows batch files (the batch language is licensed from Wilson WindowWare); and the backup program, which now supports tape drives, is fast and reliable.

The TSR programs that you load from DOS, however, can be quite troublesome. Numerous messages posted on CompuServe's Symantec forum warn of incompatibilities and potential dangers in Norton AntiVirus and in SmartErase, which stores deleted files in a hidden directory. If you have an even slightly unusual configuration, you should probably avoid both. On the other hand, a separate disk includes DOS versions of some of Norton's industrial-strength disk utilities, including the Norton Disk Doctor, UnErase, and the Speed Disk defragmenter. You also get a DOS program that restores backups made under Windows, so if your disk crashes, you don't have to reinstall Windows before restoring your files.

NDW ranks as the most powerful, most fully featured, and best engineered set of Windows utilities you can buy. Its minor flaws are barely noticeable in the splendor of its imagination and achievement. It may be more than many users need, but if you want a more customizable and flexible shell than you get from Windows itself, it is the first and perhaps the only one to try.

VSoft Development Corp.

Ready, Aim, FILE! for Windows

BY EDWARD MENDELSON

VSoft Development Corp.'s \$59.95 Ready, Aim, FILE! for Windows, Version 2.0, won't replace Windows' File Manager, but it lets inexperienced users forget about DOS files and directories and turns Windows into a giant file cabinet. The package lets you organize files in an un-

SUITABILITY TO TASK				
Ready, Aim, FILE! for Windows				
	POOR	FAIR	GOOD	EXCELLENT
Customizing desktop	N/A			
Managing files	●	●	●	●
Automating work flow	N/A			
Controlling environment	N/A			

limited number of folders, which it stores in six file drawers—a system that has no necessary relation to DOS directories. (You can store additional drawers on floppy disks but only six on your hard disk.) The opening screen displays those six drawers, complete with handles. You click to open the desired drawer, then click on the tab of the folder where you want to look for a file. A list of files appears, each identified by a descriptive name. Double-click on the name, and the file appears on-screen in the application that created it.

In order to create a file, you click on the New button and enter up to 255 characters as a name. The default application for that folder starts up, normally with an empty file, although you can set up Ready, Aim, FILE! to open a template file with customized formatting and text if you wish. Note that the DOS filename for your new file is an arbitrary number, so be prepared to stick with Ready, Aim, FILE! if you want to find the file at some point later on. The program lets you search for comments and other fields in its own filing system, but not for text within files.

FACT FILE

Ready, Aim, FILE! for Windows, Version 2.0

VSoft Development Corp., 505 S. Beverly Dr., #318, Beverly Hills, CA 90212;
310-858-3941

List Price: \$59.95.

Requires: Windows 3.0 or later

In Short: This is a file-cabinet style file manager for Windows and DOS applications, with long filenames and other conveniences. It works best for beginners who are willing to use it to launch all their applications and return to it every time they want to create a new file.

ON READER SERVICE CARD

PC EDITORS' CHOICE

HotWin

K-U-I

PC EDITORS' CHOICE

METZ Task Manager

	☐	☐	☐
	☐	☐	☐
	☐	☐	☐
	☐	☐	☐
	☐	☐	☐
	☐	☐	☐
	☐	☐	☐
	☐	☐	☐

	☐	☐	☐
	☐	☐	☐
	☒	☒	☒
	None	None	None
	☐	☐	☐
	☐	☐	☐
	☐	☐	☐
	☐	☐	☐
	☐	☒	☒

CONTINUES

The major problem with the desktop is that you can't use its file manager in a separate window. A confusing part of the design often leaves drive icons invisible when you expect to see them. If, for example, you're working in an application and you bring the desktop to the front of the application, only the program groups on the desktop appear over the application. Any drive icons that were beneath the application's window remain hidden behind it, and you have to move or minimize the application's window in order to get at them. Fortunately, you can open a directory window by the alternate route of Norton's top-line menu even when you can't find a drive icon to click on.

MINOR GRIPEs

One minor problem of the desktop is that it tends to get cluttered with tools and icons. There is an effective (but completely undocumented) way to help keep the desktop clean: If you launch a program or open a group by double-clicking on its icon with the right mouse button, the group that contains the icon disappears from the desktop.

The desktop suffers from some additional minor bugs and inconveniences.

Windows Desktop Managers

► SUMMARY OF FEATURES

PC EDITORS' CHOICE Products listed in alphabetical order ■ = YES □ = NO								
	NewWave	The Norton Desktop for Windows	Ready, Aim, FILE! for Windows	Salvation	Sloop Manager	SmartPad for Windows	Squeegee	Synergy
Work Flow Automation (continued)								
User input in scripts	■	■	□	□	□	■	□	■
Assigns scripts to hotkeys	□	■	□	□	□	■	□	□
Assigns scripts to mouse actions	□	□	□	□	□	□	□	□
Assigns scripts to icons	■	■	□	□	□	■	□	■
Can schedule one-time events	■	■	□	□	□	□	□	■
Can schedule recurrent events	■	■	□	■	□	□	□	■
Can make Dynamic Data Exchange calls	■	■	□	■	□	■	□	■
Can act as DDE server	■	■	□	□	■	■	□	□
Other Features								
Text editor	■	■	□	■	□	□	□	□
Calculator	□	■	□	□	□	□	□	□
Displays free resources	□	■	□	■	■	■	■	□
Number of .WAV files included	None	None	None	None	None	None	None	18
Backup	□	■	■	□	□	□	□	□
Virus protection	□	■	□	□	□	□	□	□
File compression and decompression	□	□	□	□	□	□	□	□
Disk optimization	□	■	□	□	□	□	□	□
Uninstall module or mode	□	■	□	□	□	■	■	□

The program's folders and drawers do not correspond to DOS directories; they are maintained internally by the program. You can see DOS filenames only by turning on an option in the file information screen. As a bonus, this option lets you move a file to a different drive or directory simply by entering the new pathname or selecting it from a pop-up list of directories that the program builds during setup. You can choose which DOS directories to use for storing new files, but you don't have to, as the program is designed for use by people who know nothing about DOS's file system. If you want, you can also call up a simple traditional two-directory file manager that appears on top of the screen full of folders.

Ready, Aim, FILE! can work well in offices with relatively untrained staff who can be convinced to return to the program every time they create a file. The next version will keep track of files created in other applications, but the current version makes you import the names of files created elsewhere, and importing is a job for experienced users only. The program cannot defeat the complexities of DOS and Windows file management, but it makes a brave and admirable try.

Vitesse Inc.

Salvation

BY EDWARD MENDELSON

Vitesse's \$69.95 Salvation, Version 1.1, combines most of the functions of Windows' Program Manager and File Manager in a single screen and throws in many additional functions as a bonus. It uses pads of buttons as program or document launchers, and its file lists use a wider variety of icons to help identify files than you ordinarily get from Windows. If you can live with Salvation's rough edges, it can give you comprehensive one-stop control over applications and documents, complete with an option that lets you mark a file for deletion but not actually

delete it from the disk until you confirm the deletion later. For ordinary users, Salvation is less customizable than some other Windows desktops, but programmers can attach utilities to its main menu or use its button pads and file lists in their own applications.

ALL-IN-ONE SCREEN

On the left of Salvation's main window is a pad of buttons, each with an icon and a text label; a standard VGA setup can hold 14 buttons. In the middle of the window is a directory listing that expands to cover the button pad when you need to see file dates and sizes. On the right of the window is a clock, a status display, and miscellaneous command buttons. You can open other screens that let you manage files in two directories, display information on disk usage, or find files by searching for filenames (but not text within those files).

A Salvation button pad or "page" resembles a Program Manager group—with some major differences. If you click on the large text label instead of the small icon, you select the button for customizing instead of launching the application. You can't iconize a pad or see more than

SUITABILITY TO TASK				
Salvation				
	POOR	FAIR	GOOD	EXCELLENT
Customizing desktop	●	●	●	○
Managing files	●	●	○	○
Automating work flow	N/A			
Controlling environment	●	●	○	○

Windows Desktop Managers

WinEZ Pro

WinTools

☐☒☐☐☐☐☐☒☐☒☐☒☐☒☐☒

None

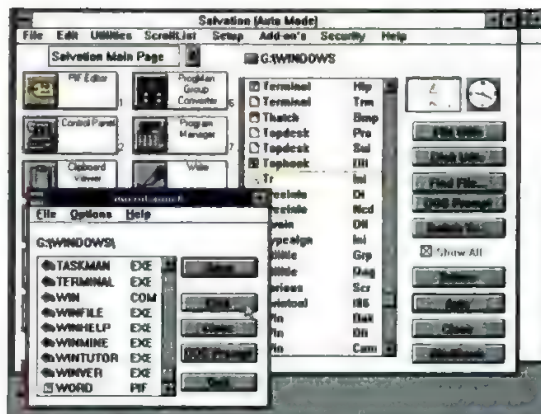
None

☐☐☐☐☐☐☐☒

ENDS

one pad at a time. Instead, you use a menu to move between pads or you create a button that jumps from one pad to another. If you don't need all the buttons on a pad, you simply leave some blank. If you reduce the size of the Salvation window, the lower buttons disappear, with no visible indication that they exist.

Salvation's directory display uses a somewhat confusing folder metaphor; to move up the directory tree, you click on a Close button to the right of the window. Normally, when you double-click on a filename Salvation either launches an ap-



plication or, for files that have no associations with a program, displays file information. But in other modes (selected at the user's discretion), Salvation can launch a built-in text editor, display graphics, or delete or rename files.

Salvation is just different enough from the Windows standard to make it potentially annoying to experienced users, but its simple menus and all-in-one main screen can make it valuable for beginners who won't mind its minor weaknesses.

Sloop Software Sloop Manager

BY BARRY SIMON

If you sat down and wrote a wish list for improvements to the Windows 3.0 Program Manager, you might come up with something very like Sloop Software's \$35 shareware product, Sloop Manager. This package substantially enhances Program Manager's feature set while retaining its basic look and feel.

Sloop Manager anticipated some of the features that Microsoft introduced in Windows 3.1's Program Manager, such as a Startup group and a browse button on the run command. But the version we reviewed is missing two important Windows 3.1 features: switch-to hotkeys and the ability to display accurate icons and captions for minimized DOS applications. The vendor expects to release an upgraded version with these features by the

time this review appears. Aside from these shortcomings, Sloop Manager has all the major features of the Program Manager—and adds more, including subgroups, password protection, and an enhanced association scheme.

EASY READING

Sloop Manager will read your Program Manager groups when you install it; you can easily add new groups later. It supports the same DDE calls as Program Manager for installing new groups so programs that query the shell will automatically install into the proper groups.

Sloop Manager's groups are not constrained to keeping their windows inside the main Program Manager window, so you can iconize them and keep them handy wherever you like on the desktop. These groups, which Sloop Manager calls folders, can contain other folders, so you can easily have groups within groups. You can even place a given folder inside several other folders.

FREE ASSOCIATION

Sloop Manager extends Windows' scheme of associating file extensions with

SUITABILITY TO TASK

Sloop Manager

	POOR	FAIR	GOOD	EXCELLENT
Customizing desktop	☒	☒	☐	☐
Managing files	N/A			
Automating work flow	N/A			
Controlling environment	☒	☐	☐	☐

FACT FILE

Salvation, Version 1.1

Vitesse Inc., 13909 Amar Rd., #2, La Puente,
CA 91747-0929; 800-777-7344,
818-813-1270; fax, 818-813-1273

List Price: \$69.95.

Requires: Windows 3.0 or later.

In Short: Salvation is an unconventional and often awkward replacement for Program Manager and File Manager that fits all its basic functions on a single screen. It is best suited for office settings.

ON READER SERVICE CARD

FACT FILE

Sloop Manager, Version 2.0

Sloop Software, 6457 Mesedge Ln.,
Colorado Springs, CO 80919; 800-847-0309,
719-260-0433

List Price: \$35. Available as shareware on CompuServe in the WINADV forum as SLPMAN.ZIP.

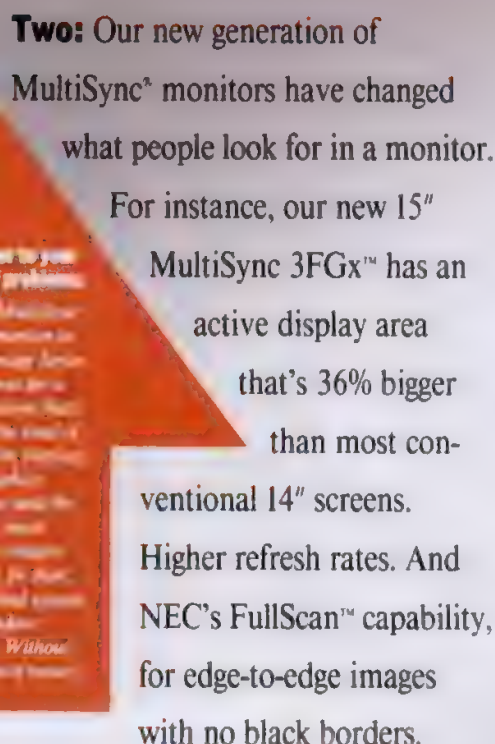
Requires: Windows 3.0 or later.

In Short: Sloop Manager acts just like Program Manager but with a shot of steroids.

ON READER SERVICE CARD

A computer system

One: NEC's revolutionary PowerMate® Image™ Series PCs give you a combination of features no other computers can. Our PowerMate SX/25i, for example, has SuperVGA capability, for resolution as high as 1024 x 768. Plus NEC's unique local bus video, which speeds information display up to 200% faster than competitive systems.



Two: Our new generation of MultiSync[®] monitors have changed what people look for in a monitor.

For instance, our new 15" MultiSync 3FGx[™] has an active display area that's 36% bigger than most conventional 14" screens.

Higher refresh rates. And NEC's FullScan[™] capability, for edge-to-edge images with no black borders.

res no

what people lo

For instan

MultiSy

activ

th

ventional

Higher re

NEC's F

for edge-

*Warranty covers all eligible PowerMate PCs and extends to eligible MultiSync monitors only when purchased with a PowerMate PC. On site limited warranty for MultiSync monitors is in addition to standard two-year MultiSync monitor limited warranty. Other restrictions apply. Call (800) 388-8888 for complete details.



that proves 1+1=3.

Three: Joining PC and monitor in perfect harmony is NEC's exclusive ImageSync™ technology. Each Image Series PC, when connected to a MultiSync FG monitor, automatically

tunes to the optimal refresh rate, producing crisp, steady images. Another plus—now selected PowerMate PC and MultiSync systems come with a one-year on-site limited warranty.*

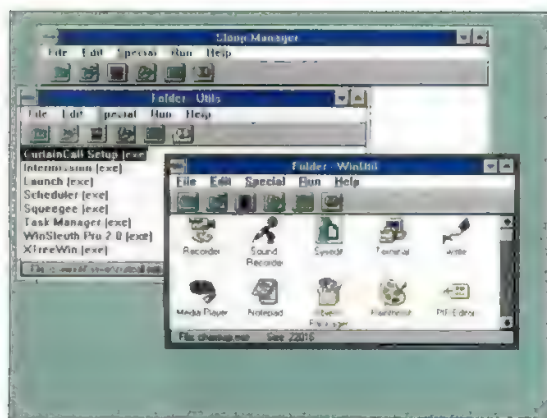


Because  is the way you want to go.

CIRCLE 157 ON READER SERVICE CARD

NEC

Windows Desktop Managers



Sloop Manager's folders can display items in text list or iconic format and come with a button bar for quick access to common menu items.

applications. Under Sloop Manager, you can associate a single extension with several applications programs; when you launch a file with such an extension under Sloop Manager, a box pops up asking which application you wish to launch it under.

Sloop Manager can present program groups as a text list as well as a collection of icons. And there is a run menu where you can place up to 50 items, with an unlimited number of submenus, that you'd like to access quickly.

Overall, Sloop Manager's interface is slicker than Program Manager's, with attractive folder icons and a button bar for six frequently performed actions such as creating new folders or items. If you basically like Program Manager, but wish it did a little more, Sloop Manager is worth a close look. And since it is shareware, you can look and then buy if you decide to use it.

Softblox Inc.

SmartPad for Windows

BY EDWARD MENDELSON

If the floating icon bars in Ami Pro or Excel 4.0 make you want similar toolboxes for other applications, Softblox's \$60 SmartPad for Windows, Version 1.0, grants your wish. It lets you create icon pads that float over the desktop throughout a Windows session. Click a button on an icon pad, and you can run programs, control your desktop, play back macros, or perform complex functions using Windows' DDE.

SmartPad lets you create pads that automatically appear when you run a specific application and perform functions in that application alone; you can have multiple pads over the same application. Or you can create a pad that appears when you run applications for which you created no specific pad. You can program icons to operate when you drag and drop filenames or other icons on them, and if you prefer the keyboard to the mouse, you can run any icon with a hotkey.

You'll find many similar functions in hDC Power

Launcher's toolbox module. But SmartPad offers customization and automation options that Power Launcher lacks, and it lets you record mouse drags in addition to mouse clicks, so you can record and play back the process of drawing a picture in a paint program. You can also create pop-up help screens for any icon on a pad.

A single command can load multiple icon pads, and you can program icons—or any Microsoft Windows application that acts as a DDE server—to launch, minimize, or close the pad the icon is on, or any other pad.

SUITABILITY TO TASK				
SmartPad for Windows				
	POOR	FAIR	GOOD	EXCELLENT
Customizing desktop	●	●	●	○
Managing files	N/A			
Automating work flow	●	●	●	●
Controlling environment	●	●	○	○

A somewhat awkward editor lets you capture screen images for use as icons and enter commands in SmartPad's DDE control language. This language includes variables, branching, and built-in dialog boxes for choosing files. You can turn on the macro recorder from the editor or any time a pad is active, and you can append additional keystrokes to existing macros.

SmartPad's main weakness—due to be fixed in the next release—is its lack of a macro editor. If you make a mistake while recording, you have to start over. A viewer displays the first 250 events in a macro but doesn't let you change them.

SmartPad enhances rather than re-

FACT FILE

SmartPad for Windows, Version 1.0

Softblox Inc., 58 Oakwood Rd., Huntington, NY 11743; 516-424-8851; fax, 516-424-0884

List Price: \$60.

Requires: Windows 3.0 or later.

In Short: This is a well-designed program for creating floating icon pads that work throughout Microsoft Windows or in specific application packages. Icons or hotkeys can launch programs, keystroke macros, or commands sent to applications via Dynamic Data Exchange. The product's main weakness is the absence of a macro editor.

ON READER SERVICE CARD

places your Windows desktop. It is powerful enough to give you one-click access to repetitive tasks, and modest enough not to interfere with the rest of your Windows environment.

ICOM Simulations Inc.

Squeegie

BY BARRY SIMON

ICOM Simulation's \$79.95 Squeegie, Version 1.0, packs a lot of wallop into a single button that appears on the title bar of your active window. A click on the button displays a text menu with Options, Tasks, and Launch submenus, plus Squeegie's "Quick Filer" and a run box. Each time it loads, Squeegie reads your program groups and includes them among the Launch submenus; you can also add items and groups of your own (including groups within groups).

Other possibilities include adding menu options for displaying particular directories and for launching several programs at once. Like Sloop Manager, Squeegie lets you associate a given filename extension with more than one application. Accordingly, when you launch such a file through Squeegie's directory, you are offered a list of all the applications associated with that filename extension.

Squeegie's Quick Filer is a simple but well designed mini-application. Rather than directory trees, Squeegie displays two file lists in which subdirectories appear as bracketed entries and ". ." repre-

Giant Savings For Windows Shoppers

That's right! You can save a full 50% off the price of our new XTree® for Windows™ file and disk management software. But you have to act fast to take advantage of this \$49.95 price because quantities are limited to less than 1% of Windows users. After this special offer, XTree for Windows will sell for \$99.00.

NEW! INCLUDES XTREE LINK FILE TRANSFER FEATURE

So try it! You'll be able to move and manage volumes, directories and files faster and with less effort than any other product. You can also create, extract and view ZIP archive files. And only XTree lets you view files from over 50 applications without running or even installing the application that created them. Open and manage as many windows as you want simultaneously. And we have added a new feature—XTree Link. This file transfer option allows you to seamlessly copy, view, move and manage your files between a PC and a laptop.

No Risk! You know the reputation of our DOS file manager, XTree Gold. We've given the same time and attention to XTree for Windows, delivering the best file and disk manager you can buy. And you'll get our normal 60 day money back guarantee.

**So go to your nearest dealer and
pick up a copy today,
or call (800)438-8871 offer #121
to order now!**



XTREE
C O M P A N Y

*This offer good for the first 50,000 units only. Percentage is based on estimated 10 million copies of Microsoft Windows. Shipping and applicable sales tax will be added to all orders placed outside of the U.S. Offer available in U.S. and Canada only. All prices are in U.S. dollars.

XTree is a registered trademark of XTree Company/Executive Systems, Inc. Windows is a trademark of Microsoft Corporation. ©1992 Executive Systems, Inc. All rights reserved. Specifications subject to change without notice.

Only Maxell warranties for life, guarantees satisfaction, and gives free advice.



Because Maxell offers the most durable and reliable data back-up products, only Maxell can offer all of the following support for its full line of 1/4" data cartridges, 5mm and 8mm data cartridges, and data cassettes.

Maxell's Lifetime Warranty will replace any tape which proves to be defective for as long as you own it. Also, if you're not satisfied with the performance of our tape products, for any reason, you may return the tape within 90 days, with proof of purchase, and choose to receive either a

replacement tape or a full refund.* We even provide a toll-free number, **1-800-377-5887**, where you can get assistance on trouble-shooting and operating problems with either our tapes or the drives themselves.

In short, nobody backs up their back-up like we do.

*Expires 12/31/92

maxell.

Always a generation ahead.

Windows Desktop Managers

SUITABILITY TO TASK

Squeegee

	POOR	FAIR	GOOD	EXCELLENT
Customizing desktop	●	●	○	○
Managing files	●	●	○	○
Automating work flow	●	○	○	○
Controlling environment	●	●	○	○

FACT FILE

Squeegee, Version 1.0

ICOM Simulations Inc., 648 S. Wheeling Rd., Wheeling, IL 60090; 800-877-4266, 708-520-4440; fax, 708-459-7456

List Price: \$79.95.

Requires: Windows 3.0 or later.

In Short: A quick-access launcher with file manipulation ability. Squeegee reads Program Manager groups each time it loads and then gives you access to them via a tiny button it adds to the active window's title bar.

ON READER SERVICE CARD

sents the parent. Located between the lists is a set of buttons that execute all the basic file management operations, including moving files and directories within and between drives.

Unfortunately, Quick Filer does not offer drag-and-drop operation, but it does provide a drop-down history list of the directories in which you recently performed file operations. You can return to any directory on the list by simply clicking on it. Quick Filer also features a button that searches for files by name and/or included text. The results of the search appear in one of the file lists, whereupon the in-

cluded files can be further copied, moved, or otherwise manipulated.

Missing from the Quick Filer are file viewers, control or viewing of attributes, and any kind of file sorting capabilities. Still, for quick file operations, it's an effective tool. In the quick-shell genre, it's a toss up between Squeegee and WinEZ Pro. Neither is great, but if your primary concern is easy access, this product offers a decent solution.

SynApps Software Inc.

Synergy

BY BARRY SIMON

SynApps Software's \$129.95 Synergy, Version 1.0, is a collection of nine innovative Windows utilities. At its core is Eclipse, an intuitive button bar builder. Other components include a rich batch language, a strong icon manager/editor, and a filename tracker.

Eclipse brings considerable flexibility to the design of task buttons. You can set button size, specify the configuration of button arrays in rows and/or columns, and establish frames and/or captions—for the entire button bar or individual buttons. You can load multiple toolbars and assign each to a specific window; you can even attach a toolbox to the menu bar of a specific application so that it loads and unloads automatically with that application.

BUTTON POWER

In addition to simply launching application programs, Eclipse's buttons can be set up to prompt you for a data file to load with the application. The buttons have even more power, however, if they are used to launch a SynApps Script Language (SSL) file or command.

SSL has over 200 functions, including variables, lists (text arrays), and if-then-else and other branching. SSL can launch applications, control their position and size, and display dialog boxes with text, buttons, and other graphic elements. The language can even call menu commands in applications and, macrolike, send keystrokes thereto.

Synergy includes a script edi-

tor and a debug mode; unfortunately it lacks links between scripts and hotkeys, and it has no script-record mode. Moreover, dialogs are set up by giving positions of elements in numbers. SSL badly needs a graphical dialog editor like those found in NewWave, Excel, Ami Pro, or Bridge Batch.

Between Eclipse and SSL, you can produce a dazzling variety of toolboxes that can work in any number of ways to speed your work. For example, a large "one-by-one" toolbox without a caption or frame becomes an object very much like the launch buttons in The Norton Desktop for Windows. A one-row toolbox attached to an application becomes a button bar much like those found in many high-end Windows apps. Short buttons with text only function as a menu that could replace the Windows Program Manager.

MORE SYNERGY

Most impressive among the remaining modules are the icon organizer, Picasso, and Psychic, an innovative utility that runs in the background, going into action whenever you open or save a file. Psychic stores the names of all the files you use and offers them to you whenever you open or save a file. This gives all applica-

SUITABILITY TO TASK

Synergy

	POOR	FAIR	GOOD	EXCELLENT
Customizing desktop	●	●	○	○
Managing files	●	○	○	○
Automating work flow	●	●	○	○
Controlling environment	●	○	○	○

FACT FILE

Synergy, Version 1.0

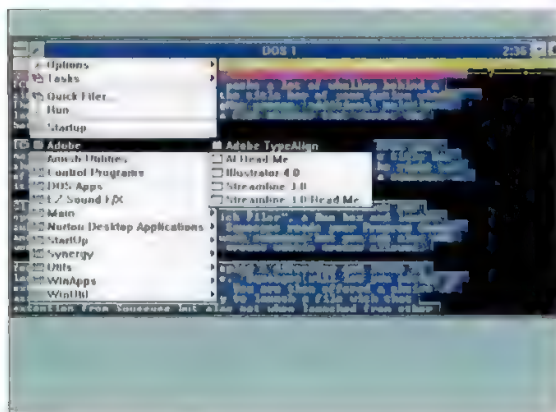
SynApps Software Inc., 2009 178th Ave. NE, Redmond, WA 98052; 206-562-3015; fax, 206-784-7125.

List Price: \$129.95.

Requires: Windows 3.0 or later.

In Short: Synergy is a collection of utilities including several standouts: a toolbar maker, a batch language, an icon editor/organizer, and a program that remembers your previous file saves.

ON READER SERVICE CARD



Squeegee places an icon right next to every window's system menu that drops down a menu of your Program Manager groups and items.

WHAT ELSE ARE THEY SLASHING



WHEN THEY SLASH PRICES?



All the price slashing going on among PC companies makes you wonder how they'll ever survive.

Chances are, many of them won't. In fact, some once high-flying clone makers have already cut too far.

They simply don't have the financial strength to keep slashing prices without cutting through the muscle, the infrastructure they need to stay in business.

As money flows out of these companies, they jump to spot markets for cheaper components, often joining the "board-of-the-month club". Inevitably, quality and reliability suffer.

And that's where you get hurt.

Now consider the alternative.

When you buy from Hyundai, you get a lot more than the latest technology. You get the strength and commitment of a \$50 billion company. Just the kind of security you might need at a time like this.

We have the financial resources to do what only the biggest players in the business can do. We control the quality on everything from mother board design to component manufacturing, from assembly and test, to service and support.

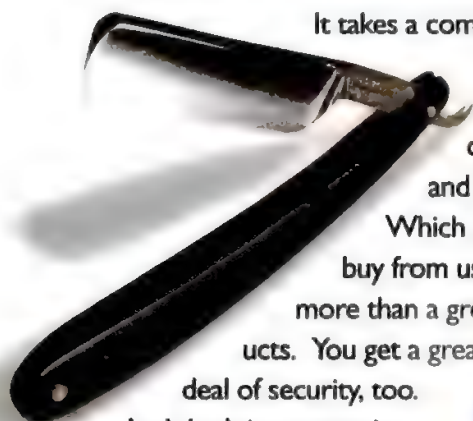
In fact, the only thing we don't control is the price.

So far, price slashing has left scores of casualties, PC companies and customers alike. Fortunately, you can still buy quality and value without getting nicked.

Call **1-800-933-3445** to buy direct. Or **1-800-288-4986** for your nearest dealer.

HYUNDAI

HYUNDAI SLASHES PRICES. AND NOTHING ELSE.



It takes a company the size of Hyundai to slash prices without cutting technology and customer service. Which means when you buy from us, you get a lot more than a great deal on products. You get a great deal of security, too.

And that's important in times like these. Because a computer without a company behind it is no deal at any price.

We make buying easy, too. Buy from our dealers or buy direct. Either way, you get computers from a company that'll be around long after some other guys may be out of the picture.

And when that time comes, you'll find Hyundai on the cutting edge.

A \$1974 value for \$1479, and we're still not shaving extras.

No matter how low prices go, we refuse to scrimp on quality. Our entry-level 386SX 20 is a perfect example. A 386SX, 20MHz processor gives you all the power you need for word processing, spreadsheets, and database management. With 4MB RAM (expandable to 8MB) and a 120 MB hard drive you'll have plenty of memory and storage to run Windows applications. You also get an ultra-high resolution, flicker-free display on a .39 mm SVGA monitor.

And it comes fully loaded with DOS 5.0, Microsoft Windows 3.1 and a mouse. So you won't find your-

self having to buy a lot of extras just to get up and running. In fact, when you purchase a Hyundai 386 SX 20, we'll even give you Microsoft EXCEL™ for FREE. That's a \$495 value.

Our customer service is expanding.

At Hyundai, we want our relationships with customers to grow. So instead of trimming customer support, we're expanding it. Our new manufacturing plant in San Jose has developed a total care quality assurance program that delivers what you want, when you want it. And that includes:

- 48-hour turnaround on custom orders.
- 48-hour turnaround on ship-in repairs.

What about warranties?

Customer satisfaction is our number one priority. When you're happy, we know we're doing our job right. And part of that job is backing you

up with support programs like these:

- 12-month on-site service with all direct orders.
- 18-month parts and labor warranty when you buy from our dealers.
- 30-day, no-risk, money-back guarantee on anything you buy direct from Hyundai.

386 SX 20

- 20 Mhz 386 SX CPU
- 4 MB RAM (expandable to 8MB; Zero wait state)
- 120 MB (19 ms) Hard Drive
- 3.5" 1.44 MB FDD
- 14" .39 mm Dot Pitch Ultra-High Resolution VGA Display
- 2 Serial, 1 Parallel I/O ports
- DOS 5.0
- Windows 3.1
- Mouse

And no matter what, for as long as you own a Hyundai computer, you can use our toll-free technical support line to call and get expert, person-to-person service. Or you can use our 24-hour FAX lines to get immediate answers to your questions.



Free Microsoft EXCEL
a \$495 value!



**Corporate Series
386 DX 40**

- 40 Mhz 386DX CPU
- 64 KB Cache Memory
- 4 MB RAM (Expandable to 64MB)
- Zero Wait State
- 120 MB (19 ms) Hard Drive
- 3.5" 1.44 MB FDD
- 14" 28 mm Dot Pitch 1024 x 768 Ultra-High Resolution Flicker-Free Display (70 Hz Refresh)
- 2 Serial, 1 Parallel I/O ports
- DOS 5.0
- Windows 3.1
- Mouse
- Upgradable Processor Architecture Allows for Easy Upgrade to 486 CPU



**Corporate Series
486 DX 33**

- 33 Mhz 486DX CPU
- 8 KB Internal Cache
- 4 MB RAM (Expandable to 64MB)
- Zero Wait State
- 64 KB Secondary High Speed Cache Memory
- 120 MB (19 ms) Hard Drive
- 3.5" 1.44 MB FDD
- 14" 28 mm Dot Pitch 1024 x 768 Ultra-High Resolution Flicker-Free Display (70 Hz Refresh)
- 2 Serial, 1 Parallel I/O ports
- DOS 5.0
- Windows 3.1
- Mouse
- Upgradable Processor Architecture Allows for Easy Upgrade to Next Generation Processor



**Corporate Series
486/33EISA**
Floor Standing Model

- 33 Mhz 486DX CPU
- 32 Bit EISA Architecture
- 4 MB RAM (Expandable to 96 MB)
- 128 KB Ultra-High Speed, Second Level Cache Memory
- 300 MB (12 ms) Hard Drive
- 3.5" 1.44 MB FDD
- 5.25 1.2 MB FDD
- 6 External Drive Bays Supporting Tape Backup, Optical, Etc.
- 14" 28 mm 1024 x 768 Ultra-High Resolution Flicker-Free Display (70 Hz Refresh)
- DOS 5.0
- Windows 3.1
- Mouse



Super 386 SX 20

- 2 MB RAM
- 40 MB Hard Drive
- VGA Supertwist Backlit CCFT (32 Gray Shade)
- DOS 5.0
- FastLynx
- Memory Expandable
- One Dedicated Internal Modem Slot



Super 386 SX 20

- 2 MB RAM
- 60 MB Hard Drive
- VGA Supertwist Backlit CCFT (32 Gray Shade)
- DOS 5.0
- FastLynx
- Memory Expandable
- One Dedicated Internal Modem Slot



Super 386 SX 25

- 2 MB RAM
- 60 MB Hard Drive
- VGA Supertwist Backlit CCFT (32 Gray Shade)
- DOS 5.0
- FastLynx
- Memory Expandable
- One Dedicated Internal Modem Slot

At Hyundai, you get more than low prices.

You get value. The kind of value that comes with quality products, great service, expert technical support, comprehensive warranties, and a money-back guarantee. That's why, the lower PC prices go, the higher Hyundai should go on your list.

Get more for your computer investment.

Call us today at one of the numbers listed below. And let us prove that with Hyundai, you can get what you want, without cutting back on what you need.

FOR YOUR NEAREST DEALER

1-800-288-4986

DIRECT FROM HYUNDAI

1-800-933-3445

Please refer to No. PCM102

HYUNDAI

Prices and product descriptions are subject to change without notice. Hyundai is not liable for damage due to omissions or errors in typography or photography. All company and/or product names are trademarks and/or registered trademarks of their respective companies.

CIRCLE 275 ON READER SERVICE CARD

Drive.



Overdrive.



TEAC, the world's leading manufacturer of floppy disk drives is leading the way again. This time with a dual floppy disk drive.

It's the FD-505 Combo Drive, a dual 3.5"/5.25" internal floppy which installs easily into a standard half-height computer bay. With it you can free up valuable space for other data storage peripherals such as CD-ROM or tape back-up.

The PC compatible Combo Drive supports read/write operation of 1.44 MB, 1.2 MB and

720 KB diskette formats and will read 360 KB diskette formats as well.

It's easy to use, too. TEAC's exclusive one-touch media insertion makes diskette loading quick and easy.

So whether you're planning to upgrade your existing system, or you're about to configure a new one, specify TEAC. To get all the details, just ask your distributor, or call (213) 726-0303, ext. 819.

TEAC.
Floppy Disk Drives

©1992 TEAC America, Inc., 7733 Telegraph Road, Montebello, CA 90640

CIRCLE 159 ON READER SERVICE CARD

■ Window Dressing

by Barry Simon

There is a story about a corporation that offered training classes in icon designing. When asked how he could justify this frivolity, the enlightened director of computing replied: "As soon as an employee returns to their machine and creates their first icon, Windows stops being a frightening, depersonalized place. Productivity soars."

Whether it's a cure for Windows-phobia or an outlet for your interior-decorator impulses, there are many ways to make Windows a more personal, lived-in place. Here are some of my personal favorites:

Heading my list is a little-known \$28.95 gem called OSFrame, from Playroom Software (704-536-3093). It gives your screens a consistent 3-D look: Title bars can have depth, and their text can be chiseled. Window frames and menu bars have a raised bas-relief look. Once you've run OSFrame for a while, Windows without it will seem dull and flat.

Playroom also offers Makeover (\$49.95), which lets you choose among a variety of overall looks.

SAFETY IN NUMBERS?

The most prolific of the personalization products are the screen savers. With modern VGA monitors, there is little reason to use one to protect your display from burn-in. But with their lively graphics and animation, screen savers are more popular than ever—as entertainment.

Nothing comes as close to being an art form as After Dark, Version 2.0 (\$49.95), from Berkeley Systems (510-540-5535), and Intermission for Windows 3.0 (\$49.95), from ICOM Simulations Inc. (708-520-4440). These two powerhouses offer dozens of screen-saver modules. They use impressively rendered bitmaps, support multimedia sound, and have modes that can display several

modules on-screen at once, as well as modes that switch between modules after a specified duration. They can even pop into action over DOS sessions in Enhanced mode.

Action lovers should look at ScreenCraze, Version 1.0, from Gold Disk (416-602-4000). This \$49.95 product provides animated sequences for both your wallpaper and screenblinker and includes an animation editor so you can roll your own. On the screensaver horizon, Sierra On-Line (800-326-6654) has announced Screen Antics: Johnny Castaway, a screensaver with an evolving story line.

CURSORY EXAM

While laptops are the force behind the move toward large on-screen cursors, big cursors are equally useful for Windows' desktop machines, especially when you are running at high screen resolutions. Our favorite is the Microsoft 8.2 Mouse Software package (\$25), from Microsoft Corp. (800-426-9400). This enlarges all system cursors. (The base 8.2 drivers ship with Windows 3.1, but the large pointer feature is available in the full software kit. Microsoft 8.2 Mouse Software is free to users of 8.0 and 8.1.)

Three other large-cursor programs that give you a variety of pointer choices are Cursorific! Professional (\$69.95), from AApex (800-728-7650); Magic Cursor! (\$49.95), from Fanfare Software (818-886-8787); and Icon Do-It (\$29.95), from Moon Valley Software (602-375-9502).

Choosing icons plays an important part in any customization of Windows. To this end, there is Russ Mueller's free collection of over 3,500 icons on PC MagNet (available as ALLIC*.ZIP in Library 10 of the Utilities/Tips Forum). QualiType (800-950-2921) sells a collection of 1,500 icons, 150 TrueType fonts, and 50 .WAV files, all for \$99.

To organize your icons, there is Picasso, a component of Synergy (\$129.95), from SynApps Software Inc. (206-562-3015). (See the Synergy review.) There is also Icon Master, a \$20 shareware utility available on PC MagNet as ICOMST.ZIP.

CRASH, BANG, SQUEAK!

You try to be kind to your coworkers' and loved ones' ears, of course, but sound is emerging as the next step in desktop personalization. Like the idea of hearing a stretching sound when you resize a window? Interesting sound effects are available in Whoop It Up (\$29.95; shareware available on PC MagNet as WHOOP.ZIP), from Synergy (800-767-9611); Wired for Sound Pro (\$79), from Aristosoft (800-426-8288); and EZSound FX (\$69.95), from Future Trends Software Inc. (608-256-1432). All these products include a number of .WAV files.

You can download additional .WAV files from various forums on CompuServe or from commercial collections such as Waves 1.0 (\$29.95), from Vitesse (800-777-7344), and MusicBytes 1.0 (\$99.95), from Prosonus (800-999-6191). MusicBytes comes on CD-ROM and contains a selection of longer cuts. First Byte (310-793-0600) offers a variant on the sound theme, Monolog for Windows (\$149), which is a text reading program that can read from the Clipboard.

Finally, there is no substitute for a little humor. Amaze Inc. (800-367-4802) has daily calendars with *The Far Side* (\$69.95) or *Cathy* (\$59.95) cartoons. The core of The Laffer Utilities (\$39.95), from Sierra On-Line (800-326-6654), is a joke teller; 16 other light utilities are included.

You will also find amusing joke programs in freeware and shareware. One of the most popular is WinRoach 1.0 (not to be confused with the PC Magazine contributing editor who has a similar name), from New Generation Software (800-964-7638). This \$12.95 program has roaches scurrying for cover whenever you move a window around on your screen. □

Windows Desktop Managers

tions access to a virtually unlimited list of recently used files.

Picasso, Synergy's icon manager extraordinaire, uses the Multiple Document Interface (MDI) to allow access to multiple icons and icon libraries (even under Windows 3.0). You can move icons among libraries simply by dragging and dropping. Picasso also provides icon editing tools that surpass anything else on the market. They perform tasks such as moving icons and making raised or lowered borders around icons. Another Synergy feature, SynAppShot, lets you capture any part of the screen (a task button from a program button bar, perhaps), adjust its shape and size to that of a standard icon, and drag it to Picasso for editing.

ALMOST SYNERGISTIC

Less exciting Synergy modules include the lackluster File Find, a multimedia audio player, a scheduler, and a program that adds miscellaneous visual and audio special effects.

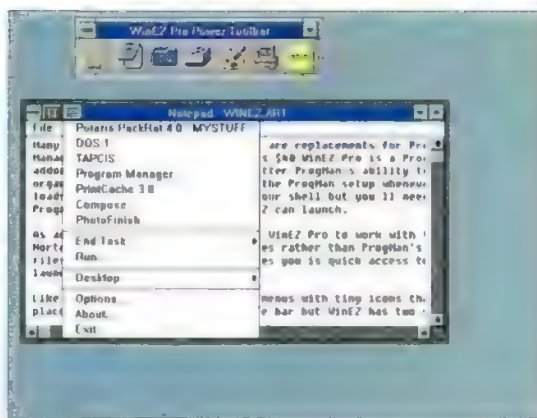
As a first-version product, Synergy is very impressive. Eclipse and SSL are both powerful tools; combined with the superb "extras," Picasso and Psychic, they are a hard act to beat. SynApps is not resting on its laurels, however: An upgrade is expected this fall which addresses some of the batch language problems and adds file manipulation operations and some clipboard-oriented utilities.

New Generation Software Corp.

WinEZ Pro

BY BARRY SIMON

Many of the programs reviewed here are replacements for Windows' Program Manager. New Generation Software Corp.'s \$39.95 WinEZ Pro, Version 1.0, however, is a Program Manager enhancement, adding value in the form of quick access to a launch menu and a task list. The package makes no attempt to improve on Program Manager's ability to organize groups; it simply reads the Program Manager setup whenever it loads. Consequently, you cannot use WinEZ Pro as your shell, and you'll need Program Manager (or another shell program like The Norton Desktop for Windows) for managing the applications that WinEZ Pro can launch.



WinEZ Pro provides an iconic toolbar and two small icons that appear on the title bar of the active window and give you access to drop down menus, including a task list.

LITTLE MORE THAN EASY

As with Squeeze, you access WinEZ Pro's menus with icons that are placed on the active window's title bar. WinEZ Pro, however, has two such icons to Squeeze's one. Clicking the right-hand icon summons up a task list (a roster of currently running applications) plus an End-Task command, a run box, and a Save Desktop submenu in which WinEZ Pro lets you save up to eight desktop configurations.

Clicking the left icon on the title bar

SUITABILITY TO TASK				
WinEZ Pro				
	POOR	FAIR	GOOD	EXCELLENT
Customizing desktop	●	●	●	○
Managing files	N/A			
Automating work flow	N/A			
Controlling environment	●	●	○	○

WinEZ Pro, Version 1.0
 New Generation Software Corp., P.O. Box 9700, Dept. 271, Austin, TX 78766; 800-964-7638, 713-283-6760; fax, 512-388-4053

List Price: \$39.95
Requires: Windows 3.0 or later
In Short: WinEZ Pro is a quick-access launcher that reads Program Manager or The Norton Desktop for Windows groups each time it loads at your option. Two buttons on the title bar give you instant access to these launch groups and to a task list

ON READER SERVICE CARD

with the left mouse button brings up a launch menu containing your Program Manager (or NDW) program groups. The groups will be listed in alphabetical order, with the exception that you can specify one of your groups to appear first.

Clicking the left-hand icon with the right mouse button launches the WinEZ Pro Power Toolbar, a button bar of the programs in the group that appears first in the menu. The Power Toolbar can be minimized and accessed directly, if you want.

With no file management capabilities, no scripts, and no way to add items not in your Program Manager/NDW groups, WinEZ Pro is little more than a minimalist task-switching/task-launching utility. Yet, those looking for super quick access to launch and task lists will find New Generation Software's WinEZ Pro an attractive tool.

Tool Technology Publishing Inc.

WinTools

BY EDWARD MENDELSON

Tool Technology Publishing's \$149 WinTools, Version 1.0a, is an alternative Windows environment—or perhaps it's a state of mind.

As an environment, it is an extravagantly customizable replacement for Program Manager and File Manager. With it, you can create program groups that automatically run everything inside them and can contain other groups. WinTools also lets you schedule groups to launch their contents at specified times, select different fonts and colors for every item on-screen, replace some or all of WinTools' icons with text-only labels, or display only icons without text.

As a state of mind, WinTools is a heroic attempt to present Windows in terms of programming "objects," instead of files and documents. WinTools is organized in fundamentally different ways from Windows or DOS—although you do your real work in the same applications you've always used—and you have to be willing to retrain yourself if you want to make WinTools worth using.

**YOU MAY HAVE
TROUBLE TELLING
THE DIFFERENCE
BETWEEN US AND
THE BIG GUYS.**

OUR STOCK HOLDERS CARRY A LOT OF WEIGHT.

So does everyone else who works here. The result of all this hard work benefits you with services you won't find anywhere else. Services like 2-day shipping, systems built to your specifications and our 30-day Express Exchange.

CompuAdd
Express
800-925-7811

EXPRESS FULL PROFILE SYSTEMS

All our Full Profiles include:

- 4MB RAM expandable to 32MB
- 64KB Static RAM Cache on motherboard
- 14" Non-Interlaced 72Hz HRVGA (512KB video memory)
- IDE hard drive
- Dual floppy drive
- Five 5.25" drive bays
- Eight I/O slots
- One parallel, two serial ports
- FREE MS DOS 5.0
- FREE Windows 3.1
- FREE serial mouse



EXPRESS 450DX2 FULL PROFILE

- i486DX2 processor rated at 50MHz (Intel clock-doubler technology)
- 200MB IDE hard drive

\$2,495

Lease for only \$92/mo.

EXPRESS 433DX FULL PROFILE

- i486DX processor rated at 33MHz
- 120MB IDE hard drive

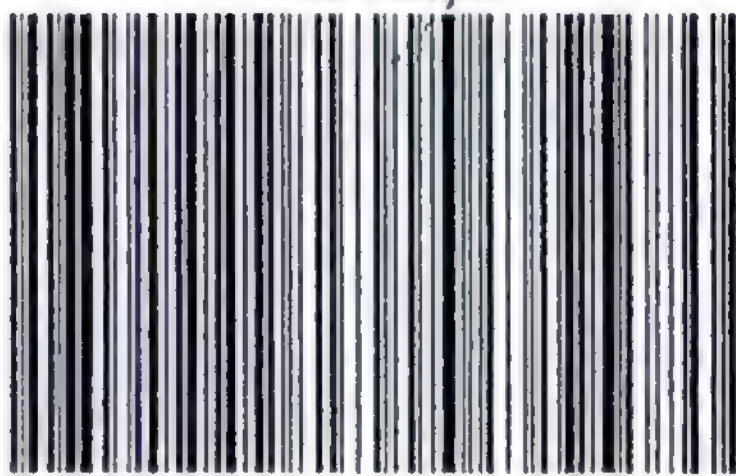
\$2,095

Lease for only \$77/mo.

1. Follow instructions on the other side

Back

GbsSlipBack-001B

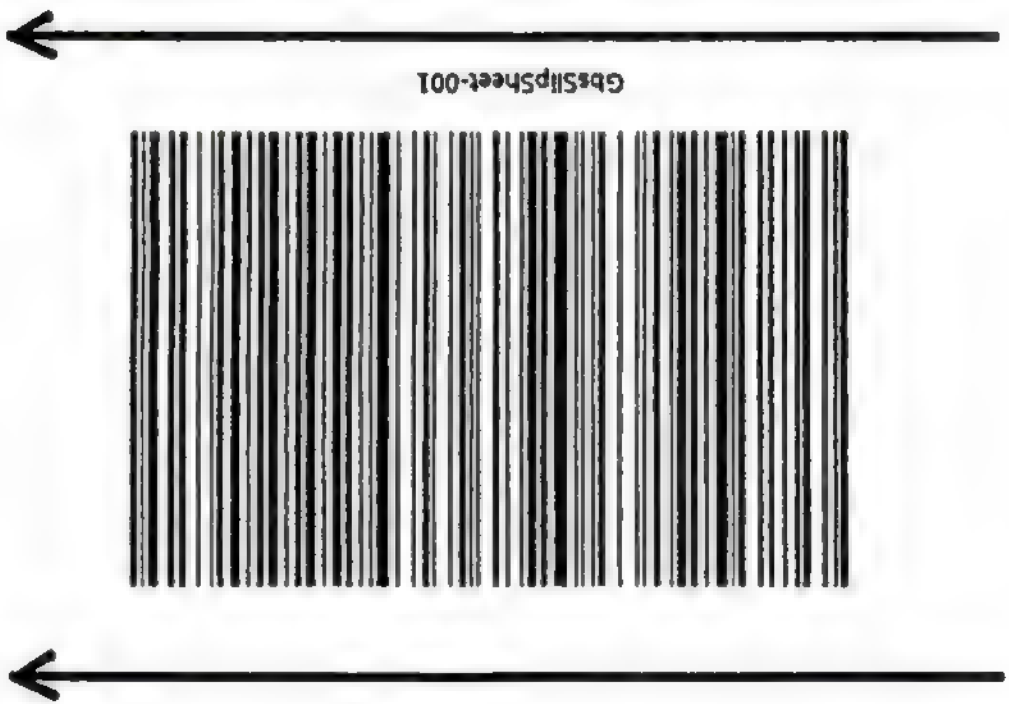


Inverted Back

1. Follow instructions on the other side

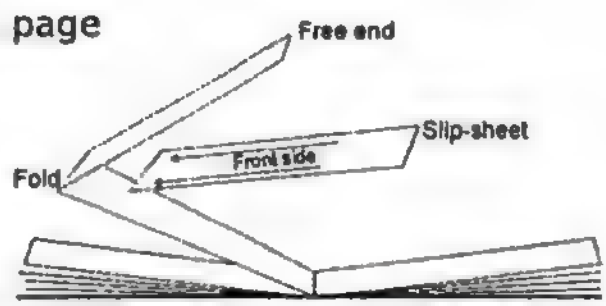
Folded edge of the page

Foldout slip-sheet

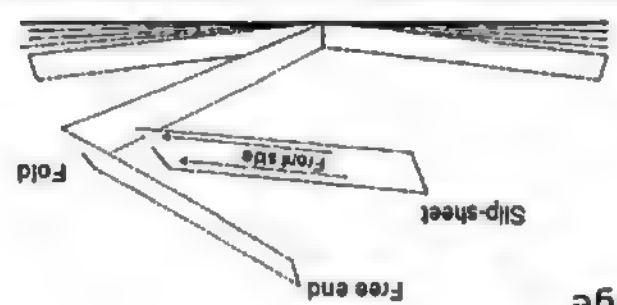


Inverted Foldout slip-sheet

1. Open the foldout page
2. Insert this sheet with
 1. Front side touching the free page
 2. Arrow pointing to the fold
3. Slice the folded edge
4. Close the page and slip-sheet

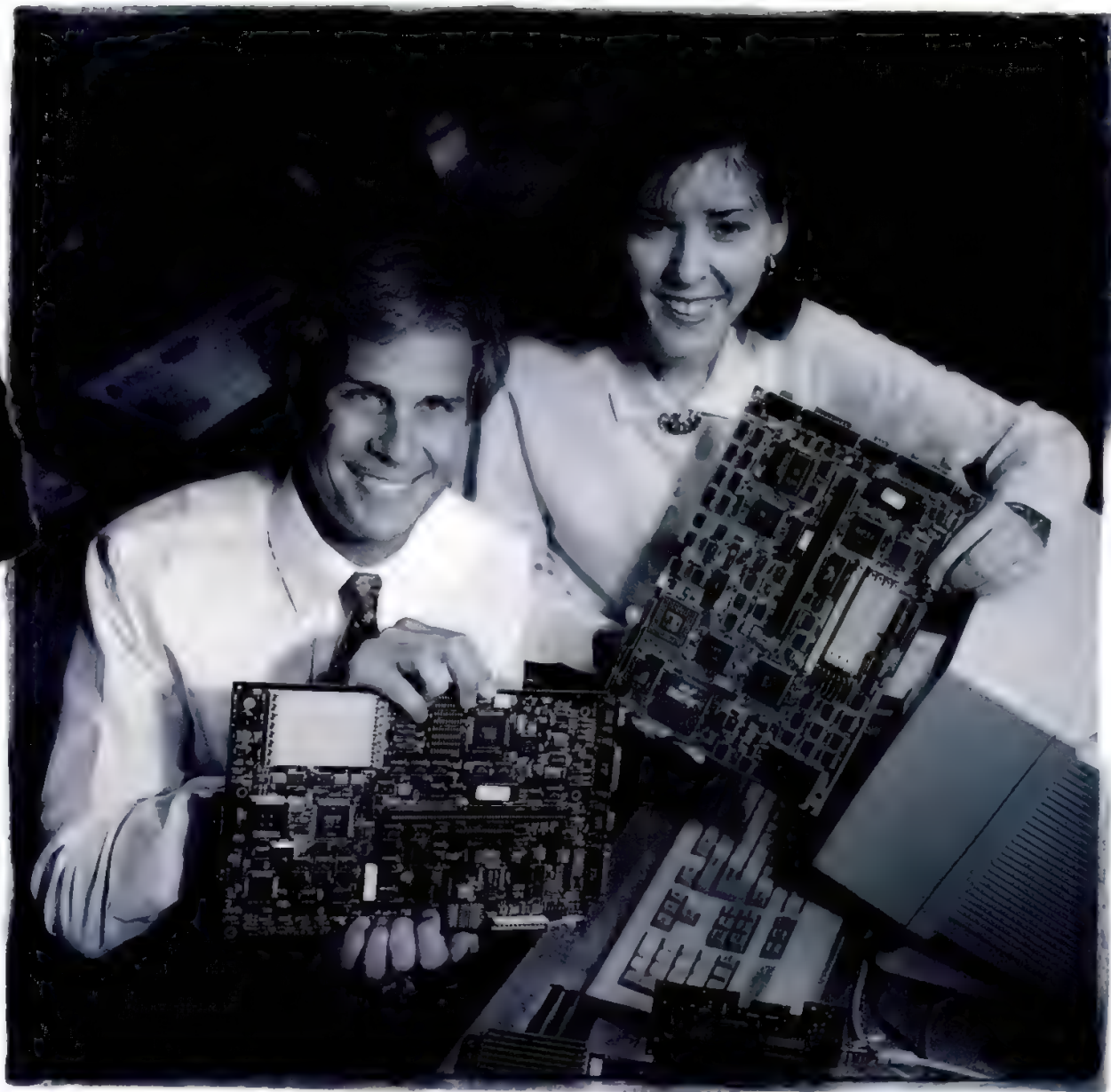


1. Open the foldout page
2. Insert this sheet with
 1. Front side touching the free page
 2. Arrow pointing to the fold
3. Slice the folded edge
4. Close the page and slip-sheet





Vince Carrett, Test Technician



Mike Hamilton, Engineer

Debbie Rood, Sales Representative

WE HOLD BOARD MEETINGS.

Sure we hold board meetings, but you'll find us sitting around a motherboard, not some big table. We've cut out the corporate bureaucracy and put our energy into designing and engineering systems that are loaded with features like upgradable motherboards, local bus video, dual floppy drives and Lexmark™ keyboards.

CompuAdd
Express
800-925-7811

EXPRESS LOW PROFILE SYSTEMS

All our Low Profiles include:*

- 4MB RAM expandable to 16MB
- Math coprocessor socket
- 14" Non-Interlaced 72Hz HRVGA (1MB memory for 1024x768 with 256 colors)
- IDE hard drive
- Dual floppy drive
- One 5.25" and two 3.5" drive bays
- Three full-size, two half-size slots
- One parallel, two serial ports
- FREE MS DOS 5.0
- FREE Windows 3.1
- FREE serial mouse
- 325SX has 2MB RAM and 512KB video memory.

EXPRESS 450DX2 LOW PROFILE

- i486DX2 processor rated at 50MHz (Intel clock-doubler technology)
- 200MB IDE hard drive

\$2,295

Lease for only \$84/mo.

EXPRESS 433DLC LOW PROFILE

- Cyrix CX486DLC processor rated at 33MHz
- 120MB IDE hard drive

\$1,695

Lease for only \$62/mo.

EXPRESS 425CX LOW PROFILE

- Cyrix CX486SLC processor rated at 25MHz
- 80MB IDE hard drive
- Video accelerator built-in on motherboard

\$1,470

Lease for only \$54/mo.

EXPRESS 340DX LOW PROFILE

- AMD 386DX processor rated at 40MHz
- 80MB IDE hard drive

\$1,495

Lease for only \$55/mo.

EXPRESS 325SX LOW PROFILE

- i386SX processor rated at 25MHz
- 80MB IDE hard drive

\$1,295

Lease for only \$48/mo.



OUR INDUSTRY CONSULTANTS DO THE TALKING.

They're listening, too. When you call our toll-free number you'll receive prompt attention. You won't have long waits on "hold" like you do with the competition.

Our technical support team can solve 90% of computer problems over the phone, in 5 to 10 minutes.

CompuAdd
Express

800-925-7811

...the 325NXL Notebook is destined to be the power accessory of the future.

Computer Shopper 8/92

EXPRESS NOTEBOOKS

Our notebooks include:

- Super-twist backlit liquid crystal display: 9.4" usable diagonally
- 64 levels of gray scale
- 9600 baud fax / 2400 baud modem; FREE Quick Link II™ software
- 80MB internal hard drive
- 1.44MB 3.5" internal floppy drive
- 4MB RAM
- Built-in mouse trackball
- Only 5.3 pounds
- Serial and parallel ports, external VGA video, PS/2 keyboard and PS/2 mouse connectors
- FREE MS DOS 5.0
- FREE Windows 3.1
- FREE LotusWorks 3.0
- FREE carrying case



...on our ZDigit Rundown test, the [325NXL] lasted nearly 5.5 hours--the third-highest score of the 70 systems tested with a battery in this issue.

PC Magazine 8/92

EXPRESS 425CXL NOTEBOOK

- Cyrix CX486SLC processor rated at 25MHz
- Math coprocessor built-in
- Over 2 hours of battery life (depending on application, individual use and power management)

\$2,595

Lease for only \$95/mo.

EXPRESS 325NXL NOTEBOOK

- AMD 386SX processor rated at 25MHz
- 80387 coprocessor socket
- 3 to 4 hours of battery life

\$2,095

Lease for only \$77/mo.



Jack McCulley, Support Technician

THE ONE THING WE DON'T HAVE IS THEIR HIGH PRICES.

EXPRESS LOW PROFILE SYSTEMS

All our Low Profiles include:*

- 4MB RAM expandable to 16MB
- Math coprocessor socket
- 14" Non-Interlaced 72Hz HRVGA (1MB memory for 1024x768 with 256 colors)
- IDE hard drive
- Dual floppy drive
- One 5.25" and two 3.5" drive bays
- Three full-size, two half-size slots
- One parallel, two serial ports
- FREE MS DOS 5.0
- FREE Windows 3.1
- FREE serial mouse

* 325SX has 2MB RAM and 512KB memory.

EXPRESS 450DX2 LOW PROFILE

- i486DX2 processor rated at 50MHz (Intel clock-doubler technology)
- 200MB IDE hard drive

\$2,295

Lease for only \$84/mo.

EXPRESS 340DX LOW PROFILE

- AMD 386DX processor rated at 40MHz
- 80MB IDE hard drive

\$1,495

Lease for only \$55/mo.

EXPRESS 433DLC LOW PROFILE

- Cyrix CX486DLC processor rated at 33MHz
- 120MB IDE hard drive

\$1,695

Lease for only \$62/mo.

EXPRESS 325SX LOW PROFILE

- i386SX processor rated at 25MHz
- 80MB IDE hard drive

\$1,295

Lease for only \$48/mo.

EXPRESS 425CX LOW PROFILE

- Cyrix CX486SLC processor rated at 25MHz
- 80MB IDE hard drive
- Video accelerator built-in on motherboard

\$1,470

Lease for only \$54/mo.

EXPRESS FULL PROFILE SYSTEMS

All our Full Profiles include:

- 4MB RAM expandable to 32MB
- 64KB Static RAM Cache on motherboard
- 14" Non-Interlaced 72Hz HRVGA (512KB video memory)
- IDE hard drive
- Dual floppy drive
- Five 5.25" drive bays
- Eight I/O slots

- One parallel, two serial ports
- FREE MS DOS 5.0
- FREE Windows 3.1
- FREE serial mouse

EXPRESS 450DX2 FULL PROFILE

- i486DX2 processor rated at 50MHz (Intel clock-doubler technology)
- 200MB IDE hard drive

\$2,495

Lease for only \$92/mo.

EXPRESS 433DX FULL PROFILE

- i486DX processor rated at 33MHz
- 120MB IDE hard drive

\$2,095

Lease for only \$77/mo.

EXPRESS NOTEBOOKS

Our notebooks include:

- Super-twist backlit liquid crystal display: 9.4" usable diagonally
- 64 levels of gray scale
- 9600 baud fax / 2400 baud modem; FREE Quick Link II™ software
- 80MB internal hard drive
- 1.44MB 3.5" internal floppy drive
- 4MB RAM
- Built-in mouse trackball

- Only 5.3 pounds
- Serial and parallel ports, external VGA video, PS/2 keyboard and PS/2 mouse connectors
- FREE MS DOS 5.0
- FREE Windows 3.1
- FREE LotusWorks 3.0
- FREE carrying case

EXPRESS 425CXL NOTEBOOK

- Cyrix CX486SLC processor rated at 25MHz
- Math coprocessor built-in
- Over 2 hours of battery life (depending on application, individual use and power management)

\$2,595

Lease for only \$95/mo.

EXPRESS 325NXL NOTEBOOK

- AMD 386SX processor rated at 25MHz
- 80387 coprocessor socket
- 3 to 4 hours of battery life

\$2,095

Lease for only \$77/mo.

WITH EVERY COMPUADD EXPRESS SYSTEM, YOU GET:

- 2-day shipping or free Federal Express delivery†
- 30-day money back guarantee
- Express 30-day exchange
- One-year onsite service warranty on desktop systems



- One-year limited warranty covering replacement or repair of defective hardware
- Toll-free technical support
- Rapid repairs

- Technical bulletin board service
- The convenience of Express Leasing
- Easy credit when you have an Express credit card

Call to order, for other configurations or to request a free catalog.

CompuAdd
Express

800-925-7811

12306 Technology Boulevard, Austin, Texas 78727 Hours: 8am-6pm (CST) M-F 512-219-1800 Fax 512-219-2890

†Applies to systems orders only. Guarantee limited to orders of 10 or fewer systems. We accept MasterCard, VISA, CompuAdd Express Charge, money orders, certified checks (please allow ten days for processing), CODs, company and institutional purchase orders (minimum initial purchase \$250, thereafter \$50 with approved credit) and wire transfers. Shipping charges are calculated according to weight and distance. Texas residents, please add appropriate local sales tax. CompuAdd Express will replace or repair defective hardware, software and consumable items. A 15 percent restocking fee may be charged. All returned items must be accompanied by a return merchandise authorization (RMA) number. Prices and product descriptions are subject to change without notice. CompuAdd Express is not liable for damage due to omissions or typographical errors.

*Windows Desktop Managers***THE TOOL'S THE THING**

In WinTools you use tools and tool containers called desks instead of files and groups; tools even replace most menus or keystrokes. You get help, for example, by dropping a tool on the Help tool, not by pressing F1. You don't modify a tool by opening an Options menu, but by dragging it to the Options tool. You even use a tool to close and open other tools, al-

though the program mercifully lets you open tools by double-clicking.

If you use WinTools as your replacement shell—it makes no sense to use any other way—the product provides an object-oriented substitute for Windows' Task Manager. Instead of a list of running programs, it displays a map of up to 16 virtual desktops, with open applications displayed graphically. (See the sidebar

"Navigating the Windows Workspace with Virtual Desktops.")

A WinTools tool looks like an icon with a frame around it. Desks that contain tools are themselves tools, and you can group desks into supertools called desk sets.

You start with a set of desks that match your Program Manager groups, and a set of "basic" tools with names like Copy,

■ The Cabbage Patch

by Barry Simon

It seems like a new Windows desktop replacement is born every day. While we were testing the 20 shipping products for this review 6 more were still in beta testing. One, Vivace, shipped just too late to make our testing deadline; the others are expected to be released by the time this article is printed or shortly thereafter. We will take a brief look at all six products.

PC-Kwik Corp. (503-644-5644; formerly Multisoft), known for its disk cache program of the same name, will release a \$129.95 utilities package called WinMaster. A central part of the program is a toolbox for launching applications; subtoolboxes can also be created. (Toolboxes, button bars, and icon bars are definitely in this year!) In addition, the package contains a system-reporting utility, called KwikInfo, and a program that compresses and archives files, called KwikVault. WinMaster's Power Scope is a file-allocation-table analyzer with more depth than any other program to date—Microsoft Windows or DOS. Also included is a Windows version of the company's disk defragmenter called Power Disk, which includes a defragmentation scheduler.

Hewlett-Packard Co. (408-720-3000) is working on a product called Dashboard for Windows. This \$99 program places a dashboard-like horizontal bar on your Windows screen. Along the top of the dashboard are small folders that open windows that look and act like the correspond-

ing Program Manager groups. The main part of the dashboard contains quick-launch buttons, a clock, control of a virtual desktop, visual gauges for free resources and memory, and quick access to printer setup.

Paper Software (914-255-0056) should release Version 2.0 of SideBar by the time you read this. The \$49.99 product (\$39.99 if ordered directly from the company) places a somewhat real-estate-hogging vertical or horizontal bar on your screen. The bar can show one or two windows, which can display either an array of task and drive icons or a file list. A menu provides access to your Program Manager groups. File operations are executed via drag-and-drop or menus.

Workspace, from ARK Interface (206-654-4189), uses lovely bitmaps to create a screen that looks like a real office with a desktop. With this \$149 product, you work in projects and assign programs to realistic-looking tools on the desktop. The version we saw looked quite attractive, but the program's functionality was far from fully implemented.

The \$145 Vivace, Version 1.0, from Digital Equipment Corp. (508-493-5111), feels like a stripped-down NewWave. It places an object-oriented shell around the DOS file system. The basic objects that appear on your desktop are files based on templates. Programs are either "editors" that have associated files or "tools" such as a calculator. Windows' File menu is replaced by an Action menu. It does not have all the richness or power of

NewWave, but it is much easier to grasp.

XTree Co. (805-541-0604) will be releasing their eagerly awaited XTree for Windows, a \$99 File Manager replacement. The beta version we saw was quite mature and included a button bar as well as numerous file viewers. XTree handles the creation and viewing of zipped files particularly well. You "mount" them onto your list of drives, after which a simple drag-and-drop will add a program to the zipped file. The viewers even work inside zipped files, a feat previously accomplished only by Lotus Development Corp.'s Magellan.

BRIEFLY NOTED

Three more packages came to our attention in the late stages of preparing this article:

Golden Retriever, Version 2.0: a modified, licensed version of Ready, Aim, FILE! for Windows, due to ship well before you read this; \$99 from Above Software Inc.; 800-344-0116; fax, 714-851-2285.

Powerstrip, Version 1.0: a Mac-like "universal" menu bar featuring program launching and drag-and-drop file compression; \$79 from Abbott Systems Inc.; 800-552-9157, 914-747-4171; fax, 914-747-9115.

proFOUND Desktop Manager, Version 1.1: an object-oriented replacement shell with both program launching and file management capabilities; \$99 from Computer Knacks Inc.; 908-530-0262; fax, 908-741-0972. □

*Windows Desktop Managers***THE TOOL'S THE THING**

In WinTools you use tools and tool containers called desks instead of files and groups; tools even replace most menus or keystrokes. You get help, for example, by dropping a tool on the Help tool, not by pressing F1. You don't modify a tool by opening an Options menu, but by dragging it to the Options tool. You even use a tool to close and open other tools, al-

though the program mercifully lets you open tools by double-clicking.

If you use WinTools as your replacement shell—it makes no sense to use any other way—the product provides an object-oriented substitute for Windows' Task Manager. Instead of a list of running programs, it displays a map of up to 16 virtual desktops, with open applications displayed graphically. (See the sidebar

"Navigating the Windows Workspace with Virtual Desktops.")

A WinTools tool looks like an icon with a frame around it. Desks that contain tools are themselves tools, and you can group desks into supertools called desk sets.

You start with a set of desks that match your Program Manager groups, and a set of "basic" tools with names like Copy,

■ The Cabbage Patch

by Barry Simon

It seems like a new Windows desktop replacement is born every day. While we were testing the 20 shipping products for this review 6 more were still in beta testing. One, Vivace, shipped just too late to make our testing deadline; the others are expected to be released by the time this article is printed or shortly thereafter. We will take a brief look at all six products.

PC-Kwik Corp. (503-644-5644; formerly Multisoft), known for its disk cache program of the same name, will release a \$129.95 utilities package called WinMaster. A central part of the program is a toolbox for launching applications; subtoolboxes can also be created. (Toolboxes, button bars, and icon bars are definitely in this year!) In addition, the package contains a system-reporting utility, called KwikInfo, and a program that compresses and archives files, called KwikVault. WinMaster's Power Scope is a file-allocation-table analyzer with more depth than any other program to date—Microsoft Windows or DOS. Also included is a Windows version of the company's disk defragmenter called Power Disk, which includes a defragmentation scheduler.

Hewlett-Packard Co. (408-720-3000) is working on a product called Dashboard for Windows. This \$99 program places a dashboard-like horizontal bar on your Windows screen. Along the top of the dashboard are small folders that open windows that look and act like the correspond-

ing Program Manager groups. The main part of the dashboard contains quick-launch buttons, a clock, control of a virtual desktop, visual gauges for free resources and memory, and quick access to printer setup.

Paper Software (914-255-0056) should release Version 2.0 of SideBar by the time you read this. The \$49.99 product (\$39.99 if ordered directly from the company) places a somewhat real-estate-hogging vertical or horizontal bar on your screen. The bar can show one or two windows, which can display either an array of task and drive icons or a file list. A menu provides access to your Program Manager groups. File operations are executed via drag-and-drop or menus.

Workspace, from ARK Interface (206-654-4189), uses lovely bitmaps to create a screen that looks like a real office with a desktop. With this \$149 product, you work in projects and assign programs to realistic-looking tools on the desktop. The version we saw looked quite attractive, but the program's functionality was far from fully implemented.

The \$145 Vivace, Version 1.0, from Digital Equipment Corp. (508-493-5111), feels like a stripped-down NewWave. It places an object-oriented shell around the DOS file system. The basic objects that appear on your desktop are files based on templates. Programs are either "editors" that have associated files or "tools" such as a calculator. Windows' File menu is replaced by an Action menu. It does not have all the richness or power of

NewWave, but it is much easier to grasp.

XTree Co. (805-541-0604) will be releasing their eagerly awaited XTree for Windows, a \$99 File Manager replacement. The beta version we saw was quite mature and included a button bar as well as numerous file viewers. XTree handles the creation and viewing of zipped files particularly well. You "mount" them onto your list of drives, after which a simple drag-and-drop will add a program to the zipped file. The viewers even work inside zipped files, a feat previously accomplished only by Lotus Development Corp.'s Magellan.

BRIEFLY NOTED

Three more packages came to our attention in the late stages of preparing this article:

Golden Retriever, Version 2.0: a modified, licensed version of Ready, Aim, FILE! for Windows, due to ship well before you read this; \$99 from Above Software Inc.; 800-344-0116; fax, 714-851-2285.

Powerstrip, Version 1.0: a Mac-like "universal" menu bar featuring program launching and drag-and-drop file compression; \$79 from Abbott Systems Inc.; 800-352-9157, 914-747-4171; fax, 914-747-9115.

proFOUND Desktop Manager, Version 1.1: an object-oriented replacement shell with both program launching and file management capabilities; \$99 from Computer Knacks Inc.; 908-530-0262; fax, 908-741-0972. □

Windows Desktop Managers



WinTools' task list, shown at the center of the screen, is a map of its virtual screens. Other tools, shown at the top of the screen, are provided by the program. The Reviews icon contains files that can all be launched at once.

Size, Tree, Keystrokes, and Trash. You create new tools by dragging files to the desktop or dragging them into desk tools or desk sets.

Tools can have convenience features you won't normally find in Windows. If you drag a tool to the Notes tool, you can open a text file and annotate the tool. You can thus create help files for any tool, and they will be displayed when a user drags the tool to the Help tool.

SUITABILITY TO TASK				
WinTools				
	1	2	3	4
Customizing desktop	●	●	●	●
Managing files	●	●	●	○
Automating work flow	●	●	●	○
Controlling environment	●	●	●	●

FACT IIII

WinTools, Version 1.0a

Tool Technology Publishing Inc., 1125 A St.,
#107, San Rafael, CA 94901; 800-793-3701,
415-459-3700; fax, 415-459-1079

List Price: \$149

Requires: Windows 3.0 or later.

In Short: WinTools is an elaborate object-oriented shell for Windows with unmatched customization options, but it has a fundamentally different style from that of Windows itself. If you are willing to put in the effort needed to tame it, WinTools can organize and automate your work to an almost unmatched degree.

ON READER SERVICE CARD

SPECIAL TOOLS FOR SPECIAL JOBS

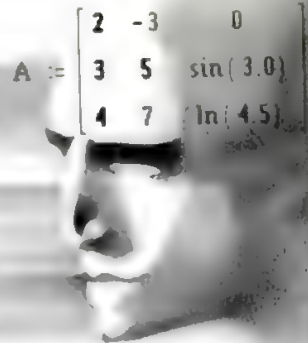
Two special types of tools let you automate keystrokes and send DDE messages to applications. Unfortunately, you can't record the keystrokes you want to play back in a keystroke tool; you have to type in names like Ctrl-F10. In order to create a DDE tool, you need to understand the basics of DDE programming, but the result can be worth the effort if you need to automate complex functions. The sample DDE tools that are provided with the package work erratically, though, and the toolbars in which they are located

can't float above the applications with which they work.

You can use WinTools to help control access to Windows in the office. Settings in an .INI file let you limit a user's rights to alter a tool or open tools other than the ones that you have specified. Because you can display tools with images or text only, you can arrange tools in the form of icon bars or menus—a method that uses WinTools object-orientation to convert Windows into a traditional menu-driven system.

An Image Librarian utility stores icons that you can use to represent any tool. It automatically imports icons from your Program Manager groups and can add images captured from the screen. It can also extract icons from other files, although it failed to find the icons in many recent Windows utilities. Tool Technology Publishing had no explanation for this problem.

WinTools' proliferation of tools and icons can ultimately save you labor—though at first they may only confuse you. You will probably spend a lot of time tracking down stray icons and deleting empty tools, and you will have to set aside many hours for careful customizing before it begins to pay dividends. You will also have to live with bugs that constantly force you to realign icons that WinTools leaves scattered about. Above all, you must embrace WinTools' object-oriented methods, which struggle constantly—and with mixed success—against the DOS files and applications that underlie Windows itself. □



COMPLETE MASTERY OVER TECHNICAL CALCULATIONS

New Mathcad® Version 3.1... Fast, Easy, Accurate

With new Mathcad Version 3.1, you'll do more math, more easily and communicate more clearly. It literally turns your computer screen into a "smart" math scratchpad.

- Writes and solves virtually any mathematical equation, numerically or symbolically.
- Easily prints out presentation-quality equations and graphics along with your explanatory text, to make you a more skilled communicator.
- Uses powerful Object Linking and Embedding (OLE) Client to directly interface with your spreadsheet, drawing, and word processing software.
- Allows "what if" calculating, so you derive better answers.
- Microsoft® Windows™ environment increases ease of use. Also available for Macintosh and UNIX.

Call 1-800-628-4223

for more information and a free demo disk. Or call

1-617-577-1017,
or fax the coupon
below to
1-617-577-8829

☐ YES! Tell me more about Mathcad 3.1

Please send my FREE Mathcad 3.1 Information Kit and Demo Disk to the address below.

Disk Size ☐ 3 1/2" ☐ 5 1/4"

Name _____

Title _____

Co./Inst. _____

Address _____

City/State/Zip _____

Phone (_____) _____

Math Soft Please mail this coupon to
MathSoft, Inc., 201 Broadway,
Cambridge MA 02139 USA
PCMS2

THE COMPAQ DESKPRO/i. SO A LIMITED PRICE LEADS

The company most qualified to advance the state of the desktop computer announces four systems that represent a breakthrough in R&D. At prices that won't ruin your P&L. Reflecting the level of thinking and quality that you've come to expect from Compaq.

At Compaq, there's a fundamental belief held by all of us that when you set extraordinary goals, extraordinary people will meet them.

Recently, for example, you made it clear to us that you wanted new PCs, with everything from advanced graphics to audio capability to affordable prices. Our

response: the COMPAQ DESKPRO/i Family of PCs. Four new systems loaded with features to

enhance productivity.

The built-in COMPAQ QVision 1024 Graphics

times faster than most popular video graphic subsystems. So quickly, as a matter of fact, you may find your computer waiting for you. Instead of the other way around.

Its unique processor upgrade path ensures



Controller, for example, allows you to scroll, re-size windows and pull down menus up to ten

that your PC won't be swept into obsolescence.

Simple chip upgradability and a 64-KB cache

*This service is provided by contracted Service Providers and may not be available in certain geographic locations. Contact the Compaq Customer Support Center for further details. © 1992 Compaq Computer Corporation. All Rights Reserved. Printed in the U.S.A. COMPAQ DESKPRO Registered U.S. Patent and Trademark Office. QVision and

MUCH FOR THE IDEA THAT TO LIMITED THINKING.

memory module option provide quantum leaps in performance. Without

Intel 386/25, 386/33, 486SX/25, 486/33 ♦ QVision accelerated graphics ♦ Chip upgradability ♦ Integrated business audio ♦ 4 MB RAM (expandable to 32 MB) ♦ Cache memory standard ♦ 3 ISA expansion slots ♦ 3 drive bays ♦ 84-MB to 510-MB hard drive options ♦ Multi-level security features ♦ Microsoft MS-DOS 5.0 as published by Compaq

unfamiliar dimension to mainstream business computing: your voice. The result of a collaboration between Compaq and Microsoft, it allows you, among other things, to actually paste voice messages into spreadsheets and documents. Either as notes to yourself or as voice-mail across your entire network.

And we've engineered this breadth of technology right onto the PC's system board, preserving the small footprint, large storage capacity and expansion of the COMPAQ DESKPRO/i. Not to mention your financial integrity.

Add CompaqCare, a new service and support program with our free, one-year, on-site* limited warranty. An Asset Management Provision that gives you and your network administrator a snapshot of your PC's configuration. And you have nothing short of a system that breaks a lot of new ground. Without breaking the bank.

For more detailed information, just call us at 1-800-345-1518, ext. 210 in the U.S., or call us at 1-800-263-5868, ext. 210 in Canada.

We bet you'll be as excited about the COMPAQ DESKPRO/i as we are.



In scrolling, window resizing and accessing menus, our new QVision accelerated graphics beat the competition by as much as 10 to 1.



You can paste voice messages into Microsoft Windows 3.1 business documents and spreadsheets with our integrated business audio system.



similar outlays of cash.

The fully integrated audio system brings an unprecedented, yet not

CompaqCare are trademarks of Compaq Computer Corporation. Product names mentioned herein may be trademarks and/or registered trademarks of their respective companies. The Intel Inside logo is a trademark of Intel Corporation.

AN INEXPENSIVE PC THAT FROM THE COMPANY THAT

What happens when the best computer engineers in the world design a low-priced desktop PC? You get the new COMPAQ ProLinea Line of PCs, perhaps the best value PCs in the world. What happens when a clone maker designs a low-priced PC? You get what you pay for.

When Compaq engineers set out to build an affordable, full-performance desktop PC with all the essential features, there were a lot of options to choose from. We could have bought

an existing low-end computer company.

We could have farmed out all manufacturing.

We could have bought parts from the cheapest vendor in town.

But then all we would have ended up with is simply another inferior,



*This service is provided by contracted Service Providers and may not be available in certain geographic locations. Contact the Compaq Customer Support Center for further details. © 1992 Compaq Computer Corporation. All Rights Reserved. Printed in the U.S.A. COMPAQ Registered U.S. Patent and Trademark Office. ProLinea and

T'S AS GOOD AS A COMPAQ. HAT OUGHT TO KNOW.

low-priced clone. And what we wanted was a low-priced COMPAQ computer.

Which is what you told us you wanted.

So through some high levels of chip integration and some equally high levels of engineering,

Intel 386SX/25 ♦ small footprint ♦ 2 MB RAM ♦ 2 ISA slots ♦ 2 drive bays ♦ 40- or 84-MB hard drive
Intel 386SX/25 ♦ 2 MB RAM ♦ 3 ISA slots ♦ 3 drive bays ♦ 84- or 120-MB hard drive
Intel 486/33 ♦ 4 MB RAM ♦ 3 ISA slots ♦ 3 drive bays ♦ 84- or 120-MB hard drive
All models include high-resolution 1024 x 768 video and pre-installed Microsoft MS-DOS 5.0 as published by Compaq

design and just plain common sense, we've cut costs in system design and manufacturing.

While still managing to deliver 100 percent of

the virtues you've come to expect from Compaq.

You can choose from three different models, opting for either Intel 386SX/25 or 486/33 processing power.

So whether it's expansion, storage, processing speed or a small footprint that you're most concerned with, there's a model perfectly suited to your needs.

And each comes with a high-resolution 1024 x 768 video system.

Most importantly, the new COMPAQ ProLinea PCs are backed not only by the assurance of the COMPAQ name, but also by CompaqCare, our new

service and support program. Which includes a free one-year, on-site* limited warranty, and a host of other services.

And to go along with our new line of PCs, there's a whole new line of places you can find them. Give us a call for more details.

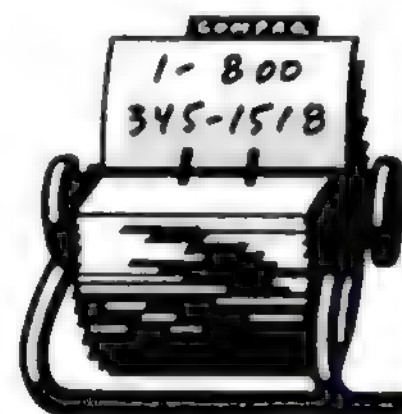
In the U.S., call us at 1-800-345-1518, ext. 215, and in Canada, just call 1-800-263-5868, ext. 215.

We think you'll be pleasantly surprised at exactly how much the COMPAQ ProLinea PCs have to offer.

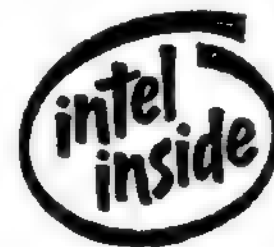
And equally surprised by how little we're able to offer them for.



All in all, the COMPAQ ProLinea 3/25s PC sizes up quite nicely. At a mere 12.6" x 14.9" x 3.5", it's one of the smallest footprints in the industry.



All of our models are backed by CompaqCare, our comprehensive new service and support program. For details, just call 1-800-345-1518.



Even I, Mr. Magoo, Can See The Advantages Of This New 17" Color Monitor.



Model
SC 726V

According to Mr. Magoo, most monitors are little bitty things. Can't see 'em at all.

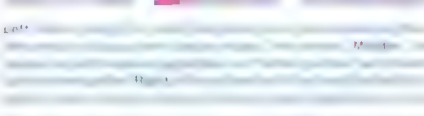
But Samtron's newest color monitor is an eye-opening 17" (13.6" wide, 10.22" high). Enough screen even for his feeble vision.

Which also makes it just the thing for you, if you want to peer at lots of Windows.[™] Or spreadsheets. Or pages of text.

Finer .26mm Dot Pitch.

The screen is not only bigger, its dot pitch is smaller. Honed to a fine 0.26mm. Together with 1,024 x 768 resolution, that means a far sharper picture. More visible details. With less flickering edges where colors meet.

What's more it's built with Samtron's non-interlaced, flicker free technology.



SAMTRON

WE'RE WORTH WATCHING

14251 E. Firestone Blvd., Suite 101, La Mirada, CA 90638
Phone (310) 802-8425

Sophisticated Flat-Screen.

Magoo also likes the fact that the screen is flat. And the corners square. So there's less distortion near the edges, more of the screen that's usable.

Big Screen, Small Size.

Amazingly, this much monitor comes in a very small package. It's only 16" high by 16.8" deep by 16" wide. And with Samtron's automatic degaussing coil, Magoo gets a perfect picture just by turning on the system.

But of all the things Mr. Magoo likes about our new 17" color monitor, its best feature is something he can't see.

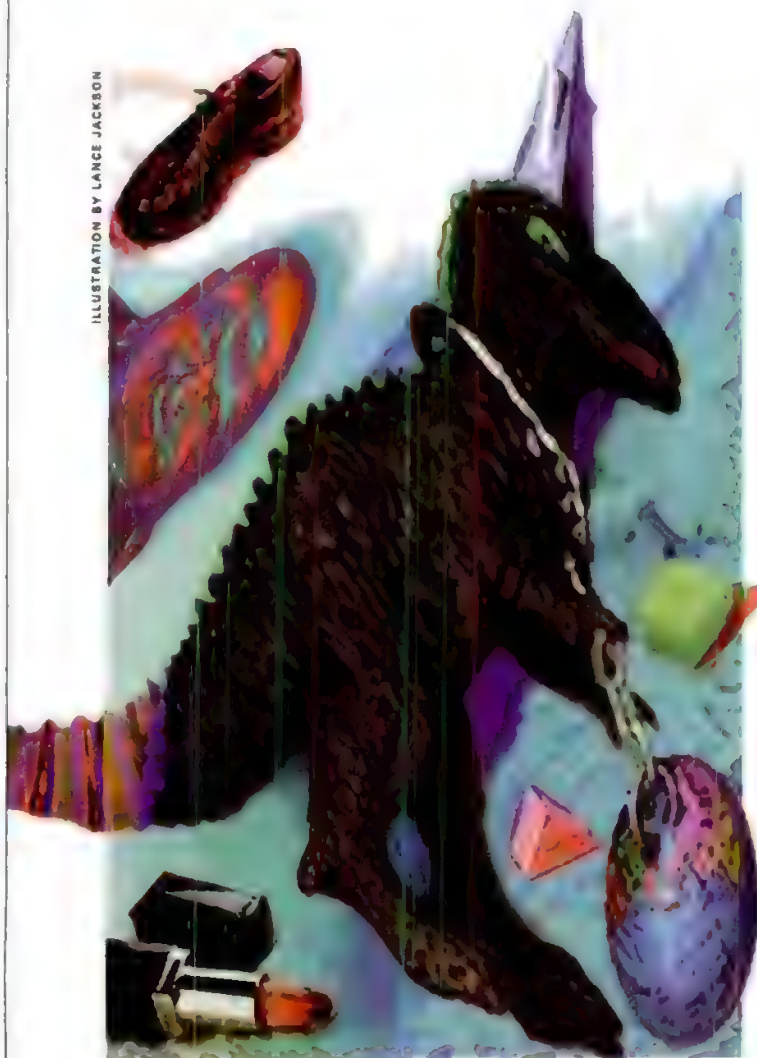
The reliability of the Samtron name.

TRUE-COLOR IMAGE-EDITING SOFTWARE

Darkroom, R.I.P.?

Editing images on the PC is easier than ever. But you still need heavy-duty hardware and a lot of patience.

ILLUSTRATION BY LANCE JACKSON



Bitter experience has taught us that a hard disk full of 24-bit true-color pictures—or even 256-color gray-scale images—does not necessarily translate to usable images. Low-cost scanners and high-resolution graphics adapters make it possible for a wide variety of users—including professional designers, photographers, and even businesspeople—to acquire and display high-quality full-color images on the desktop cost-effectively. But blown-out highlights, jaundiced flesh tones, and banal product shots are all tell-tale signs of projects produced on the PC.

IN THIS REVIEW

<i>Aldus PhotoStyler</i>	188
<i>Image-In-Color</i>	201
<i>Image-In-Color Professional</i>	201
<i>ImagePals</i>	205
<i>PhotoFinish</i>	210
<i>Picture Publisher</i>	223
<i>PixoFoto</i>	231
<i>Publisher's Paintbrush</i>	210

by Luisa Simone

Image-Editing Software

Image-editing software can transform those less-than-optimal scans into perfect pictures. Think of the eight products in this review—Aldus PhotoStyler, Image-In-Color and Image-In-Color Professional, ImagePals, PhotoFinish, Publisher's Paintbrush, Picture Publisher, and PixaPhoto—as electronic dark-rooms. In traditional photographic dark-rooms, artists and technicians develop images, alter exposures, and control the printing process. The programs we look at here give you all of these controls—and much, much more.

We chose these products primarily for their ability to operate within a selection area or *mask*, a feature that exponentially increases the flexibility of an image-editing package. They include tools—such as

airbrushes, cloning, and special-effects filters—to retouch or artistically enhance pictures as well as sophisticated filters to adjust a picture's tonal range or color balance. And they can all drive color scanners directly to input 24-bit images. WinRix, from Rix Softworks, met our selection criteria but behaved too erratically for us to evaluate the package properly. We subsequently dropped the product from this roundup.

At first glance, it may be difficult to distinguish these image-editing products from competitors, which include image-processing utility programs as well as high-end paint products. All are bit-mapped graphics applications, so some overlap is inevitable; and in truth, paint programs and image-editing software are

more alike than they have ever been.

Mathematica's Tempra Pro, for example, began life as a paint program but now directly supports scanners and allows you to make dramatic changes to your pictures automatically through the use of a variety of filters. On the whole, however, it is much more likely for a paint program to require you to make changes manually. For example, Fractal Design's Painter allows you to convert a scanned photograph into a simulated watercolor or pencil sketch, but only by painting each individual brush stroke.

The differences between the products reviewed here and image-processing utilities are more subtle. HALO Desktop Imager, our Editors' Choice winner when we last reviewed image-processing programs ("Capture and Conversion the Windows Way," June 16, 1992), allows you to perform some sophisticated *gamma correction* (a nonlinear method by which you can adjust a picture's tonal range or color balance). So by using a gamma curve—also called a *color/gray map*—you can brighten a picture's mid-tones without affecting the highlight or shadow values. But where HALO stresses global enhancement, all of the products in our roundup have the ability to perform operations on parts of an image, rather than the whole.

Finally, even Aldus Gallery Effects did not meet our selection criteria. Gallery Effects is a collection of special-effects filters (such as Mosaic or Poster Edges) that can jazz up entire images or even selected portions of a picture. But, unlike the programs reviewed here, Gallery Effects isn't intended to handle image correction. Therefore, it doesn't contain the admittedly mundane—but essential—filters like Despeckle or Equalize, which let you correct flaws in a poor scan, nor does it contain editable color/gray maps, which allow you to edit a specific tonal range (such as midtones) separately from other ranges (such as highlights and shadows).

FINDING THEIR AUDIENCE

The eight products reviewed here target specific audiences through feature set and price. Products such as PhotoFinish (\$199), from ZSoft Corp., and ImagePals (\$249), from U-Lead Systems, are clearly intended for individual entry-level or

Suitability to Task:

Image-Editing Software

To test the mettle of these packages, we used them to process three images. First, we evaluated their ability to correct a scan of a badly damaged antique photograph. In the process, we tinted and altered the background to test the basic image-manipulation capabilities, then annotated the image to test the text handling.

The second procedure involved integrating two relatively large images (10MB to 15MB) using each package's painting and masking tools. Finally, we used each package to scan a black-and-white halftone (using HP ScanJet IIc's), then to clean up the moiré artifacts and visible dot patterns.

We printed all the final images on either an HP LaserJet III or a QMS ColorScript 100; the antique photo was output to 4- by 5-inch transparencies by MagiCorp.

Good scanner drivers are an essential first step for **photo retouching**. You'll also want flexible tonal-adjustment capabilities to enhance the highlight, midtone, and shadow areas of an image, and effective global filters (such as Sharpen or Despeckle) to correct flaws in the source photo. A basic but well-designed set of selection tools will allow you to limit your changes to the areas that need the most work. A simple but attractive set of fonts allows you to annotate your images.

SUITABILITY TO TASK				
Product Name	POOR	FAIR	GOOD	EXCELLENT
Photo retouching	●	○	○	○
Creative editing	●	●	○	○
Hard-copy output	●	●	●	○
Electronic output	●	●	●	●

For **creative editing**, you'll want at least the same tools as for photo retouching. Beyond the basic assortment of selection tools, however, powerful area- and color-masking capabilities are a must for any creative work. In addition, a well-chosen set of special-effects filters can help you quickly add a bit of pizzazz to your images, and a robust set of painting tools is essential for those who desire true creative flexibility.

Hard-copy output can range from a simple black-and-white printout on a PCL5 printer to film separations from a PostScript-compatible image setter. The package should be able to print quickly, easily, and accurately to your chosen output device. We did not judge these packages on the quality of their color separations.

When editing a file for **electronic output only**—for use in an image database or presentation, for example—the abilities to resample down to a smaller resolution, to compress images drastically, and to perform various types of palette optimization and color reduction become very important. In addition, image-management and browsing capabilities can be a great help.



EDITORS' CHOICE

business users. At the opposite end of the spectrum, are products like Aldus PhotoStyler, Image-In's Image-In-Color Professional, Micrografx's Picture Publisher, and PixoArts Corp.'s PixoFoto that provide professional-level tools with price tags to match—from \$500 to \$900.

Selection tools, which you would expect to be standardized, are a good indication of a program's level of sophistication. Most of the programs let you define a selection area as a rectangle, ellipse, or free-form shape. And most also let you use the magic wand to select an area based on color similarity. However, the more advanced programs let you treat the selection area as a mask, meaning that you can edit the shape, invert the active area, and export or import masks for future use. Picture Publisher, for example, maintains the selection marquee as a vector outline, which makes it possible to transform the shape with curve-editing tools. And while PhotoStyler uses a bit-mapped mask, it is easy to fine-tune a shape by adding to or deleting from the current mask using any of the selection tools. Compare this with PhotoFinish, which doesn't allow you to use a selection area as a mask to constrain painting tools such as the fill bucket.

Picture Publisher, among others, also allows you to clone data from one document window to another, and modify or feather an irregularly shaped mask. This last feature makes it possible to color correct and balance foreground images separately from the background.

Often entry-level products trade off some power in favor of convenience. For instance, PhotoFinish contains an easy-to-use tinting tool that lets you apply translucent color with a paintbrush. With a high-end product, you must configure the normal painting tools to create the same effect. Though it takes a little more time to master, customizing the painting tools ultimately gives you a wider range of options. For instance, you can paint with a specified degree of opacity, affect only the hue (leaving the brightness and saturation unchanged), or apply paint only if a pixel is darker or lighter than the current color.

Arbitrarily defining yourself as a power user or as an image-editing tyro is a bad way to choose a program. A much

- Aldus PhotoStyler
- PhotoFinish
- Picture Publisher

While three Editors' Choice awards out of a field of eight might seem a bit much, each selection has much in its favor. Aldus PhotoStyler and Micrografx's Picture Publisher are very different products, but both offer powerful image-editing tools.

At \$795, PhotoStyler has strong painting and masking capabilities; it is the only product that allows you to export an 8-bit mask—a staple for high-end products of this type. With Aldus's plug-in technology, currently utilized only by its Gallery Effects series of add-on special-effects filters, this becomes an even more flexible, extensible product.

Picture Publisher's masking tools—especially its Color Shield color-masking and Automask selection tools—are different from PhotoStyler's, but equally powerful in their own way. With its exceptionally well-designed interface, which in most cases minimizes the need to hunt for tools, and a moderate cost of \$495, Picture Publisher represents an excellent value.

ZSoft Corp.'s PhotoFinish has its flaws—an inability to work with large files, for one—but for \$199, you get an easy-to-use package that should fulfill modest needs, with some high-powered tools thrown in for good measure. Once ZSoft adds some of PhotoFinish's functionality to the more expensive Publisher's Paintbrush (\$495), that program may become more competitive at its price.

We must give an honorable mention to ImagePals, a \$249 product that uncomfortably straddles the worlds of

graphics utilities and image editing. Although it is probably the weakest of the group for image editing, its excellent screen-capture and image-management tools make it a welcome addition to the desktop publisher or desktop presenter's toolbox.

While the \$795 Image-In-Color Professional has a few tools notably absent in the competition—namely a Bezier curve and the ability to combine selection areas—the implementations tend to fall short of truly useful, especially when compared with the less expensive Picture Publisher. Similarly, the \$495 Image-In-Color, which is less capable still, doesn't begin to measure up.

Finally, our lone DOS product, PixoFoto, proved a mixed bag. At \$895, it's the most expensive product in the category, and it offers some excellent and unique painting tools, such as the ability to apply any custom brush to a Bezier curve. But performance during testing was erratic, especially on the large images that a product this expensive should be able to handle. Its hardware requirements—a TIGA board—seem a bit steep in these days of cheap Microsoft Windows-accelerated graphics adapters. However, the next version of the product will support a broader range of adapters.

more sensible approach starts with a clear definition of your role as production manager, photographer, or designer. For example, if you see image editing as part of the production process, you will want retouching and correction tools. The abilities to analyze the distribution of tonal values via a histogram, directly edit color

or gray maps, and apply filters like Despeckle or Sharpen that can clean up a noisy scan are essential features.

On the other hand, there is no doubt that Aldus PhotoStyler is best at producing the artsy effects that designers and illustrators want. Functions like Merge Control and Compute give you total crea-

GRAPHICS

Image-Editing Software

tive control when combining picture elements. And you can expand the program's extensive collection of special-effects filters by installing Aldus Gallery Effects as a plug-in application.

In most cases, you will use image-editing programs to prepare your pictures for hard-copy output. All of the programs here can send files to a laser printer. But if you want bright, clean printouts, look for programs that allow you to create and save printer calibration curves. The ability to control halftone patterns and line-screen frequencies is equally important for 300-dot-per-inch Hewlett-Packard laser printers and 1,200-dpi PostScript image setters.

If you need to produce four-color separations, be prepared to invest in one of the higher-priced packages, such as Picture Publisher, Image-In-Color Professional, or PixaFoto. These are the only image-editing products that provide useful controls for print production—such as under-color removal (UCR), gray-component replacement (GCR), ink absorption, and dot gain. (For a discussion of how these programs stack up against standalone color-separation utilities, see the sidebar “Separation Anxiety.”)

Although paper is still the number-one delivery medium, electronic output—in the form of multimedia applications, visual databases, videotapes, and desktop presentations—is increasingly popular. File compatibility, compression techniques, and organizational functions are issues that you cannot afford to ignore.

Photographers who want to organize their images should look into ImagePals. With this program, you can browse thumbnail representations of your pic-

tures, and even execute keyword searches.

NEVER TOO MUCH MEMORY

We tested these packages using a 33-MHz 486 with 16MB RAM, a 310MB hard disk, and a graphics adapter with a Texas Instruments graphics coprocessor. But despite the power of the test-bed, speed was a major issue. For example, the ZSoft products—PhotoFinish and Publisher's Paintbrush—were so slow that we were forced to drop the resolution of the test im-

ages from 300 dpi to 150 dpi. In fact, PhotoStyler and Picture Publisher were the only programs in the roundup that could deliver satisfactory performance with several high-resolution, 15MB images displayed simultaneously. On the whole, however, the Microsoft Windows-based products in this roundup outperformed their DOS-based counterpart: PixaFoto required 32MB of memory, and still delivered only marginally acceptable response times.

One rule of thumb to follow is that you need twice as much memory as the largest image to be edited. That means you need large amounts of hard disk space (for virtual memory) in addition to a machine packed full of RAM. You should also take the time to confer with technical support as to the optimal memory configuration for your package; the Windows-based programs are especially sensitive to SMARTDRV and swapfile settings.

To judge the performance of image-editing software accurately, in terms of both speed and functionality, you must consider programs written for the Apple Macintosh—specifically, Adobe Photo-

shop. Though we hate to admit it, System 7's true 32-bit operation and superior memory-management techniques keep products like Adobe Photoshop one step ahead of the DOS- and Windows-based programs (see the sidebar “Mac Hegemony”).

For years, everyone has been asking the same questions about PC-based image-editing software: Will these programs ever totally satisfy quality-conscious production managers? Can automated calibration routines and special-effects filters make these programs accessible to casual business users? Will photographers eventually see the computer as an extension of the camera? The programs reviewed in this story come close to providing the definitive answer to these questions, and the answer is yes.

Aldus Corp.

Aldus PhotoStyler, Version 1.1a

BY LUISA SIMONE

With PhotoStyler (\$795), Aldus Corp. hopes to duplicate the success of Adobe Photoshop on the PC platform by offering a similar toolbox, similar menu structure, and most important, similar flexibility.

Aldus PhotoStyler contains the standard complement of painting tools, including airbrush, paintbrush, cloning brush, and eraser, and provides the configuration options to give these tools extra punch. You can choose to erase part of an image in a straightforward manner, replacing pixels in the photograph with the current background color, or you can use the eraser tool as a local undo function by configuring it to revert to the last-saved version of your image.

SUITABILITY TO TASK

Aldus PhotoStyler

	POOR	FAIR	GOOD	EXCELLENT
Photo retouching	●	●	●	●
Creative editing	●	●	●	●
Hard-copy output	●	●	●	●
Electronic output	●	●	●	●

*Generally, you'll need
twice as much
memory—RAM and
virtual combined—as
the largest image
to be edited.*

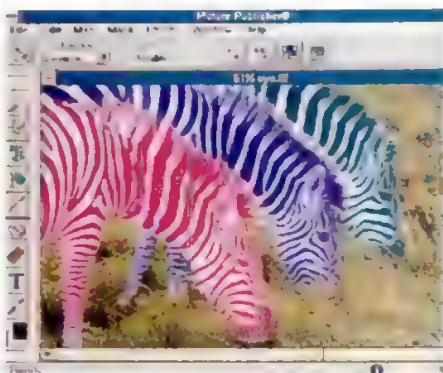


PHOTO BY THOM O'CONNOR

Our Contributors: LORI GRUNIN and JENNIFER ZAINO are associate editors of *PC Magazine*. GAYLE C. EHRENMAN and LANCE ULANOFF are staff editors of *PC Magazine*. LUISA SIMONE is the author of *Microsoft Publisher* (Microsoft Press, 1992) and a contributing editor to *PC Magazine*. JEFF MACE is a project leader of PC Magazine Labs. PAULINE ORES is a New York-based free-lance writer. BARRIE SOSINSKY is the author of *Beyond the Desktop: Tools and Technology for Computer Publishing* (Bantam Books, 1991).

How to add the perfect photo to everything you produce.

Picture Publisher® turns plain photos into desktop publishing dynamite!



Scan it in.

With easy-to-use Picture Publisher®, you start by importing photos into your PC. TWAIN support means you can use almost any scanner. You can also import images from a variety of other sources, including on-line services and the new Kodak® Photo CD.



"The best competitor out there." *PC Magazine*

Touch it up.

Once the images are in your PC, you put Picture Publisher's retouching and enhancing capabilities to work. You can adjust colors. Sharpen or blur edges. Colorize black-and-white images. Combine images to create a montage. And experiment with filters, masks and special effects. A user-friendly Windows interface makes it all easy!

With powerful features like these, it's no wonder Picture Publisher outscored all other PC and Macintosh image editing packages in recent *InfoWorld* reviews, and won *Publish* magazine's Reader's Choice award in each of the past three years.

Crank it out.

You'll be able to export your images to popular desktop publishing, word processing and presentation packages. You can even produce color separations, slides and pre-press materials.

Call for a free guide!

Say the word and we'll rush you a copy of our full-color guided tour of Picture Publisher. *Call today!*

New Version 3.1 only \$495! Current users call for special upgrade pricing!

1-800-398-2412

M I C R O G R A F X®

Micrografx, Inc., 1303 Arapaho, Richardson, TX 75081 (214) 234-1769. Micrografx has offices in Toronto, Paris, London, Munich, Milan, Sydney, Copenhagen and Tokyo.
Copyright ©1992, Micrografx, Inc. All rights reserved. Micrografx and Picture Publisher are registered trademarks of Micrografx, Inc.
All other products are trademarks or registered trademarks of their respective owners.

CIRCLE 361 ON READER SERVICE CARD



**Our new tape drive
has five times the features for
one times the price.**

The new Iomega® Tape250.

Introducing the next generation in tape backup. Iomega's new 250MB tape drive, the Tape250.



It does five times as much as any other tape drive on the market—for the same price or less.

The only drive you need.

The Iomega Tape250 is the only drive that reads QIC and Irwin tapes. The only DC2000 drive that fits a standard 1 inch floppy bay. The only one that works with other QIC 80 tapes and software. And the

Minicartridge Tape Drive Comparison			
	Iomega Tape250	CMS Jumbo	Irwin AccuTrak
QIC 80 Read & Write	•	•	
QIC 40 Read	•	•	
Irwin 80 & 40 Read			•
Windows 3.1 & DOS software	•		
Fits standard 1" bay	•		
QIC 80 entry price	\$299	\$350	\$349

only one optimized specifically for Windows 3.1. It even includes

award-winning Central Point software for both Windows and DOS.

The safe choice.

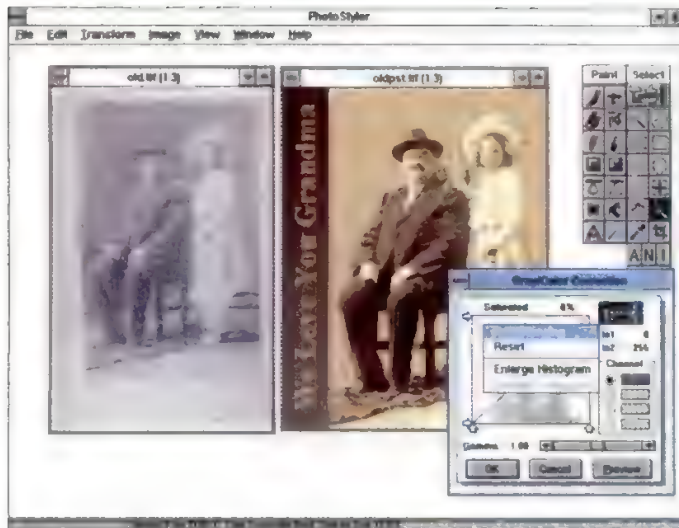
You can feel confident trusting your data to Iomega, the makers of Bernoulli®. We've been making quality storage products for over ten years, winning more awards than any other fixed or removable drive manufacturer. Earning a 99 percent customer satisfaction rate. And we're the only computer company to win the Shingo Prize for excellence in American manufacturing.

Call 1-800-945-9414!

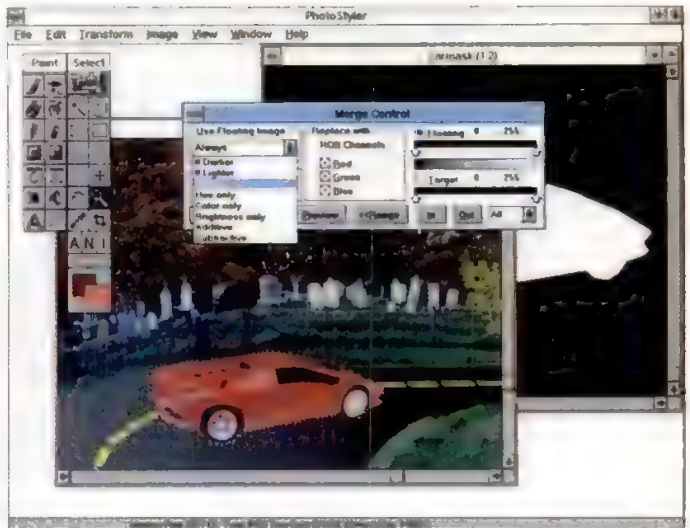
There's much more you should know about Iomega's new Tape250, like specific pricing and configurations. So call today for a free brochure. You'll be five times as glad you did. **I-MEGA®**
Makers of Bernoulli

CIRCLE 378 ON READER SERVICE CARD

Image-Editing Software



Creating the sepia-toned photograph using Aldus PhotoStyler was a simple matter of pasting a transparent brown rectangle over the original picture. Alternatively, we could have used the Compute function to combine the gray-scale image with a solid brown one. The Auto Ranging command within the Gray/Color Map dialog box makes it easy to redistribute tonal values in a photograph.



Masking is one of Aldus PhotoStyler's most powerful features. Here you can see that the mask in the current picture has been exported into a separate window, where it can be modified and saved to disk for future use. In addition, the program's Merge dialog box lets you control how the pixels of the currently selected area will interact with the underlying image.

All of PhotoStyler's painting, color palette, and selection tools are located on the floating palette, which has come to be a hallmark of other Aldus products, such as PageMaker and Freehand. You can customize the painting tools with different brush shapes, specific flow rates, and varying degrees of transparency. The package also allows you to use the painting tools as image-editing tools. For example, by painting with the Hue Only option, you can change the colors in a picture without changing the saturation or brightness levels. This makes it easy to colorize gray-scale images or to change a red dress to blue while maintaining all of the details.

The ability to customize the painting tools came in handy during PC Magazine Labs' tests. Using the cloning brush with both soft edges (also known as *anti-aliasing*) and transparency allowed us to successfully repair a seriously damaged antique photograph with a minimum of fuss and bother, because the cloned pixels were automatically blended into the surrounding image. At the moment, however, the cloning tool doesn't work between windows.

Part of PhotoStyler's power stems from its ability to use the seven different tools in combination to create and then edit a selection area. On PC Labs' tests, we used the magic wand to select the car based on color similarity, and then used

the free-form tool to redraw and fine-tune portions of the selection.

LEARNING THE TOUGH STUFF

To get the most out of PhotoStyler, you will have to learn about gamma correction, color models, gray maps, and histograms. To its credit, however, this package makes these functions more



FACT FILE

Aldus PhotoStyler, Version 1.1a

Aldus Corp., 411 1st Ave. South, Seattle, WA 98104; 206-622-5500; fax, 612-888-3665

List Price: \$795.

Requires: 2MB RAM, DOS 3.0 or later, Microsoft Windows 3.x. 386-based PC or better, 4MB RAM, 16- or 24-bit graphics adapter recommended.

In Short: Aldus PhotoStyler is a powerful image-editing program with especially good painting tools that can handle simple tune-ups for better reproduction as well as special effects and creative endeavors.



ON READER SERVICE CARD

understandable by organizing them under logical menu headings and presenting them in self-explanatory dialog boxes.

Novices will appreciate the Brightness and Contrast commands, which use simple slider bars to adjust a picture, or Auto Ranging, which automatically redistributes the tonal values in a photograph.

More advanced users will take advantage of the four different ways (Piecewise, Smooth, Gamma, Logarithm) that PhotoStyler offers users to edit the Gray/Color Map directly.

Both novices and pros will be enchanted by PhotoStyler's extensive collection of special-effects filters. Users who tire of the built-in effects can either create customized filters or add additional filters with the \$199 Aldus Gallery Effects add-on package. The first volume of Gallery Effects, Classic Art, appears as a menu item within PhotoStyler and offers 18 additional special-effects filters.

Ultimately, these special effects may prove less useful than some of the program's more mundane, production-oriented features. For example, one of PC Labs' tests involved converting a black-and-white halftone into a gray-scale image. PhotoStyler provides several excellent mechanisms to handle this everyday chore. For starters, it allows you to specify the size of the halftone cell, then it averages the value of the printer dots, and combines them into a single pixel with an equivalent gray value. Smoothing the understandably blotchy picture was simply a matter of using the Gaussian blur and Despeckle filters.

MINOR IMPERFECTIONS

Of course, PhotoStyler isn't perfect. The program cannot scale text larger than 150



Performance Tests: Image-Editing Software

Picture Publisher clearly won for overall speed. But our tests turned out to be a tortoise race: Even the fastest of these packages can leave you with plenty of time for lunch breaks during edit operations on large images.

HOW WE TESTED

We evaluated these products on Compaq Deskpro 386/25M, EISA systems equipped with 486/33 cards, 16MB RAM, 310MB hard disks, 24-bit Matrox Impression/AT graphics adapters running at 1,024-by-768 resolution, Compaq DOS 5.0, and Microsoft Windows 3.1 running in Enhanced mode. For input under Windows, we used the Wacom SD-510C, a 6- by 9-inch tablet, with both its pressure-sensitive stylus and its puck.

After consulting with the vendors about the optimal Windows configuration, we created a 20MB permanent swapfile and configured SMARTDRV with a minimum Windows cache of 6MB. Both parameters were lower than those recommended during Windows setup. But the tested packages use their own virtual memory schemes, which required modification of the Windows defaults for peak performance.

To test PixaFoto (which does not support the Matrox board), we used Opta's Mona-Lisa 24-Bit Color Display Board and QEMM-386 for memory management. When analyzing these results, keep in mind that when we last tested the MonaLisa board, it was significantly slower than the Matrox (for details, see "24-Bit Graphics Adapters: True Color and Plenty of Horsepower" in the January 14, 1992, issue).

Our tests were designed to evaluate the programs' agility during common operations on large amounts of pixel data. Each operation was performed on the same 6- by 9-inch 300-dot-per-inch scanned image (approximately 12.5MB of image data).

PhotoFinish and Publisher's Paintbrush were unable to work with files this large without locking up the machine or taking more than 30 minutes to run.

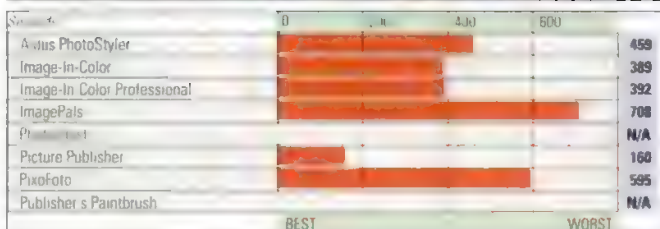
The **Arbitrary Angle Rotate** test measures the time it takes to rotate a selected region 153 degrees. We approximated the angle in Picture Publisher because the package does not allow exact specification.

To time the **Screen Redraw**, we forced a full-screen refresh of the image by moving

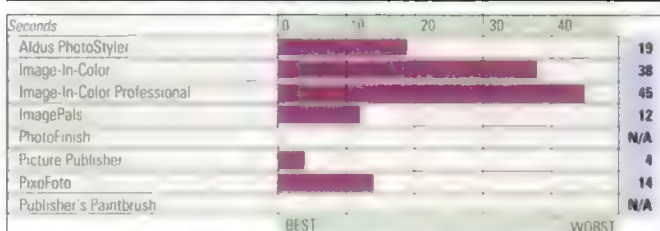
from a 400 percent view down to a fit-in-window view. We conducted this test immediately after opening the file to eliminate the effects of any caching.

To measure **Resampling** time, we resampled a true-color 8.75- by 7-inch 300-dpi image down to 4 by 5 inches at 150 dpi.

ARBITRARY ANGLE ROTATE



SCREEN REDRAW



RESAMPLING



N/A - Not applicable. The two ZSoft packages were unable to handle files this large.

points, even if you are using Type 1 (via a type scaler) or TrueType fonts. And though it may seem a minor point, PhotoStyler doesn't provide predefined calibration curves: This means you will have to develop your own gamma-correction settings for the screen, printer, and scanner you are using. And if PhotoStyler expects to become useful to desktop publishers, it will have to improve its limited color-separation functions and add support for the DCS (Desktop Color Separation) format.

Even when you run into one of PhotoStyler's few limitations, however, its flexibility offers an easy workaround. For example, to change a gray-scale image into sepia tones, we could have employed the Hue and Saturation sliders to shift the grays toward brown. Alternatively, we

could have used the program's Compute function to combine the values mathematically in the original gray-scale image with a second document consisting of a single brown color. But we decided to take the simple approach and pasted a brown rectangle over the original gray-scale image. Best of all, the Merge Control dialog box allowed us to set parameters, such as which channels would be affected by the paste as well as the degree of transparency.

While other programs in our roundup choked on our 15MB, 300-dot-per-inch test files, PhotoStyler handled several of these images on-screen simultaneously without a hitch—albeit with slower response times. But PhotoStyler does exhibit understandable trade-offs between functionality and performance. For ex-

ample, while the package allows you to use either the standard Windows Clipboard or a proprietary clipboard, the proprietary clipboard spools to disk often, noticeably degrading performance. Several of the special-effects filters also require patience—in addition to a high-powered processor and lots of RAM. For example, a motion blur of only 20 pixels took 40 minutes to complete when applied to a 300-dpi image.

PhotoStyler deserves special praise for a tutorial and a manual that explain difficult concepts using plain English and lots of full-color pictures. While it exceeds the needs of casual users, PhotoStyler's power and flexibility make it the program of choice for serious business users, professional artists, and production technicians.

**A Vision Of Beauty Outside,
Zenith Data Systems
Brilliance Inside.**



ZENITH DATA SYSTEMS

A BULL COMPANY

Get The Only Network-Ready PC-



You are ready to "talk" to other computers instantly, because ZDS installs pre-configured Client Shells™ for Novell® NetWare®, Microsoft® LAN Manager™ and Banyan® VINES®



— the first for any notebook system! Just connect to the LAN, using an optional media adapter, and select a shell for your network.

You'll save time with the Z•NOTE! Its high-speed communications port transfers data more than twice as fast as a typical AT-compatible workstation, and is more than four times the speed of a portable LAN adapter connected to a conventional notebook PC.

Ease of Use

With pre-installed software like Microsoft® Windows™ 3.1 and MS-DOS® 5.0, plus a Logitech™ TrackMan® Portable pointing device bundled with every system, you're ready to start immediately!

The Z•NOTE is an expert at managing power! The nickel metal-hydride battery offers up to 10 hours* of operation

Zenith Data Systems' brilliance really shines in the first network-ready! PC-compatible notebook! It's no wonder *Byte* magazine's editors honored the Z•NOTE notebooks with the Best of Show Award at Comdex/Spring! And it was no surprise when the *Wall Street Journal* found Z•NOTE performance quick and almost flawless.

"In almost every respect, the Z•NOTE's design shows

careful attention to the way people work with little computers." — *Wall Street Journal*, May 14, 1992

Integrated Connectivity

When you're on the go, the Z•NOTE makes communication easier, faster and less expensive than ever. You get built-in Ethernet® LAN capability, so accessing corporate network resources is a snap. It's another industry first from Zenith Data Systems — and it's incredibly affordable!



Compatible Notebook...Direct!

using the "rest/resume" mode, or four hours* of



continuous battery operation. You never have to re-boot a Z•NOTE, just close the lid to "rest" and return to work by opening it — up to two weeks later!

Design and Ergonomics

For a convenient, inexpensive alternative to traditional desktop docking units, opt for the READYDESK™ port replicator. The READYDESK makes it easy to plug an external monitor,

keyboard and printer into your Z•NOTE. Just unsnap and you're ready to hit the road!

"Smart designs, like Zenith Data Systems' READYDESK, are making that one-PC goal a reality." — Jim Seymour, *PC Week*

Investment Protection

The Z•NOTE offers an unprecedented range of upgrade options. The hard drives on the 60MB and 85MB units can be easily upgraded to 120MB. The 1.44MB floppy disk drive can be replaced with a 2.88MB when available. Memory can be expanded up to 12MB, and a numeric coprocessor and a fax/modem can be installed in seconds.

If you're ready for color — it's here! The new Z•NOTE 325Lc features a bright, vivid active-matrix color display. At 6.5 pounds, the Z•NOTE is the lightest



OPTIONAL
READYDESK
PORT
REPLICATOR
JUST
\$107

active-matrix color notebook yet!

If you don't need color yet, all black-and-white Z•NOTES are upgradable to color.

Call today to order!



ZENITH DATA SYSTEMS

A Bull Company

Z•NOTE 320L Lowest Price Ever!

- Intel 20 MHz i386SL
- 2MB RAM expandable to 12MB
- 60MB hard drive with MS-DOS 5.0 and Windows 3.1 pre-installed
- Logitech Trackman Portable mouse included
- 9.5"(v) black-on-white LCD, upgradable to active matrix color, 640 x 480 VGA with support for 64 grey shades; and simultaneous video support
- 3.5" 1.44MB floppy drive
- 8.5" x 11.9" x 1.9", only 5.9 pounds
- Rapid-charge nickel metal-hydrate battery for 4 hours* continuous use or 10 hours* under rest/resume condition
- Ethernet-compatible high-speed communications port for LAN connectivity
- Pre-installed network Client Shells for Novell NetWare, Microsoft LAN Manager, Banyan VINES
- 82-key keyboard with 12 full-size function keys
- Optional TotalCare Service

\$2,399



Z•NOTE 325Lc Best Value!

- Intel 25MHz i386SL
- 4MB RAM expandable to 12MB
- 120MB hard drive with MS-DOS 5.0 and Windows 3.1 pre-installed
- 8.4" active matrix color LCD, 640 x 480 VGA with 16-color support; simultaneous video support
- 3.5" 1.44MB floppy drive
- 8.5" x 11.9" x 2.1", only 6.5 pounds
- Rapid-charge nickel metal-hydrate battery for 2.5 hours* continuous use or 6.5 hours* under rest/resume condition
- Ethernet-compatible high-speed communications port for LAN connectivity
- Pre-installed network Client Shells for Novell NetWare, Microsoft LAN Manager, Banyan VINES
- 82 key keyboard with 12 full-size function keys
- Optional TotalCare Service

\$4,999

For other configurations please call.

*Battery life depends on configuration, peripherals attached and applications used.

†with optional media adapter

Call 1-800-472-9234 today and see how your future is built-in!

Now Direct: The ZDS Z-STATION™



Z-STATION quick and easy. An "icon roadmap" helps you achieve "picture perfect" installation and productivity!

Investment Protection

Upgrade and expand in a snap! The Z-STATION's unique snap-in architecture makes it easy and inexpensive. Choose from a range of CPU and hard drives to make the most of your network now, and down the road. The SCSI module connects you to mass storage devices like hard drives, tape back-

ups, CD-ROM and output peripherals instantly.

Simply plug Intel OverDrive™ Processor Upgrades

into an open upgrade socket, and you nearly double your speed! Every Z-STATION has Super VGA at 1024 x 768, 16 colors, and you can get a

256 color spectrum in the blink of an eye with a simple memory upgrade!

Leave it to Zenith Data Systems to turn the network nightmare into a dream! With interchangeable, upgradable components and ready-to-run networking options, the Z-STATION family functions the way workstations should. And on a budget to boot!

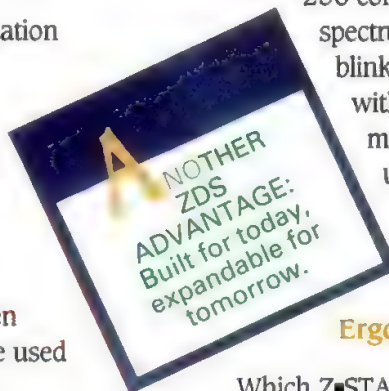
Integrated Connectivity

The Z-STATION line of ISA- and EISA-based systems is the smart choice for super-sophisticated connectivity, and the only choice for novice networkers. No one can afford to waste time or money, so ZDS pre-installs network Client

Shells for Novell NetWare, Microsoft LAN Manager, and Banyan VINES. Z-STATIONS come with Ethernet-compatible high-speed communication LAN ports.

Ease of Use

MS-DOS and MS-Windows appear before you even insert a disk! Icons are used throughout hardware, applications, manuals and packaging to make getting acquainted with the



Design and Ergonomics

Which Z-STATION is your dream machine? The entire line is built on modular architecture that uses either

Makes Networking Easy!

EISA or ISA bus, in a 2- or 4-slot cabinet. Consistent design means any choice looks sleek and professional!

Your performance pick...

When performance and storage are key, the Z•STATION 4-slot design is king. A 2-slot platform works well in highly integrated environments where the network provides secondary storage and other resources such as faxes, modems and access to mainframes.

Z•STATION En (EISA, 2-slot) is great for the graphics guru! This Z•STATION includes the Windows Accelerator Module which whips up to 3 to 5 times faster video performance in many Windows applications! It is ideal for graphics-intensive applications like desktop publishing, design, engineering and software development.

Z•STATION Eh (EISA, 4-slot) is tops if maximum performance and expandability are high on your list. This workstation can function as a server for a local network, database or UNIX. It handles all your business needs hands-down!

Z•STATION n (ISA, 2-slot) offers value galore for the cost-conscious networker! It breezes through general business applications like sales administration, order entry and data collection. Like the whole ZDS family, it grows with your needs and budget.

Z•STATION h (ISA, 4-slot) is perfect as a

remote site, multi-function workstation with four open ISA slots and two open module slots for SCSI and Windows Accelerator

Module. Feel free

to pack it with peripherals!

Any Z•STATION is easy and economical to upgrade for your future needs and tomorrow's technology. Z•STATIONS take the work and worry out of networking!

Call today to order!

For other configurations please call.
'with optional media adapter



ZENITH DATA SYSTEMS

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

Z•STATION 325Sn

A price performer!

- Intel 25 MHz 386SX (upgradable)
- 4MB RAM expandable to 16MB
- 80MB hard drive pre-installed and optimized with MS-DOS 5.0 and Windows 3.1
- VGA color monitor
- Pre-installed network Client Shells for Novell Netware, Microsoft LAN Manager, Banyan VINES
- Ethernet-compatible high-speed communication port for LAN connectivity
- 3.5" 1.44MB internal floppy drive upgradable to 2.88MB
- State-of-the-art modular "snap-in" system design with 2 ISA slots
- 1024 x 768 Super VGA, upgradable to 256 colors
- Module sockets for SCSI and WAM (Windows Accelerator Module)
- Flash ROM BIOS
- Dual password security protection
- Serial, parallel, PS/2 mouse and keyboard, video ports
- Microsoft PS/2 mouse included
- TotalCare Service

\$1899



Z•STATION 433Dh

Affordable performance!

- Intel 33 MHz i486DX (upgradable)
- 4MB RAM expandable to 64MB
- 200MB hard drive pre-installed and optimized with MS-DOS 5.0 and Windows 3.1
- Super VGA color monitor
- Pre-installed network Client Shells for Novell Netware, Microsoft LAN Manager, Banyan VINES
- Ethernet-compatible high-speed communication port for LAN connectivity
- 3.5" 1.44MB internal floppy drive upgradable to 2.88MB
- State-of-the-art modular "snap-in" system design with 4 ISA slots
- 1024 x 768 Super VGA, upgradable to 256 colors
- Module sockets for SCSI and WAM (Windows Accelerator Module)
- Flash ROM BIOS
- Dual password security protection
- Serial, parallel, PS/2 mouse and keyboard, video ports
- Microsoft PS/2 mouse included
- TotalCare Service

\$2849

Call 1-800-472-9234 today and see how your future is built-in!

Get The Notebook With Performance, Expandability, and Value



Little notebooks typically mean BIG prices, BIG compromises and BIG risks. But it's a whole new game buying direct from a name you trust.

As powerful as a desktop

As sleek notebooks, Z-SPORTs are outfitted with powerful i386SX or advanced i486SX processing power and high-capacity drives ranging up to 120MB that leave the competition in the dust! And for complete desktop functionality simply slide your Z-SPORT into the optional full-featured docking unit.

Look your best with the advanced display

In training and presentation sessions, this ZDS notebook is a real crowd pleaser. With simultaneous video capabilities you can display VGA video on both the internal LCD and an external display device at the same time.

Even in one-on-one competition, the Z-SPORT LCD really shines! Its large 9.5" black-and-white edgelit display supports 64 grey shades compared to the typical 32. The Z-SPORT creates a clear backdrop for graphics and text regardless of lighting conditions.

A keyboard without compromise

The standard 86-key keyboard positions the most commonly used keys in the places you would expect to find them. It features 12 function keys and a separate inverted "T" cursor layout.

Superb Value

Now you don't have to choose between affordable or powerful, expandable or portable or even portable or desktop; the Z-SPORTs have it all! And buying direct from Zenith Data Systems makes it even better. You get the lowest price possible on a top quality product from a company you know.

Call today to order!

Z-SPORT 325S Model 60

- Intel 25 MHz i386SX
- 60MB Hard Drive with MS-DOS 5.0 pre-installed
- 2MB RAM expandable to 8MB
- 9.5"(v) black-and-white edgelit LCD, 640 x 480 VGA with 64 grey shades, simultaneous video support
- 3.5" 1.44 MB floppy drive
- 8.5" x 11" x 1.9", only 6 pounds
- 2.5 hour* battery life
- 86-key keyboard with dedicated cursor and function keys
- Serial, parallel, external video, PS/2 mouse ports
- AT connector for optional docking unit
- Modem and memory sockets
- Optional TotalCare Service

\$1999

Z-SPORT 420S Model 85

- Intel 20 MHz i486SX
- 85MB Hard Drive with MS-DOS 5.0 pre-installed
- 4MB RAM expandable to 12MB
- 9.5"(v) black-and-white edgelit LCD, 640 x 480 VGA with 64 grey shades, simultaneous video support
- 3.5" 1.44 MB floppy drive
- 8.5" x 11" x 1.9", only 6.2 pounds
- 2 hour* battery life
- 86-key keyboard with dedicated cursor and function keys
- Serial, parallel, external video, PS/2 mouse ports
- AT connector for optional docking unit
- Modem and memory sockets
- Optional TotalCare Service

Call For Availability

\$2899

*Battery life depends on configuration, peripherals attached and applications used.

For other configurations please call.

Choose A ZDS Z-SERVER™ That Meets Your Needs.

Zenith Data Systems proudly announces its new family of Z-SERVERS to provide you with the finest in customized systems.

Integrated Connectivity

Whether your applications require a high performance communications server or simply a multi-user terminal server, Z-SERVER provides the solution! It's the ideal server platform for Novell NetWare, Banyan VINES, Microsoft LAN Manager, IBM™ LAN Server and SCO UNIX.

Ease of Use

Servicing and upgrading your performance and capacity have never been easier! With Z-SERVER's unique modular approach and cabling and installation schemes, upgrades and module replacements are quick and simple. The

snap-in peripheral rail design is just that... a snap!

Investment Protection

All Z-SERVER systems are ready to fully support the next generation Intel processor — the P5! System memory can be upgraded from 4MB to 192MB. The 16-bit SVGA video provides you with immediate high-resolution video capability! And with the 300MB and 500MB internal drives, and chassis support for up to eight drive bays, this system can accommodate a wide range of work loads.

Plus, with the Z-SERVER high-efficiency 384-watt power supply, there's no need for costly incremental upgrades.

Security on the Z-SERVER series couldn't be tighter! ZDS limits access to its systems via multiple security features including two chassis keylocks, a keyboard lock, and a password system.

Call today to order!



ZENITH DATA SYSTEMS

Z-SERVER 425SE Entry-level server!

- Intel 25MHz i486SX
- 4MB RAM expandable to 192MB
- 300 MB SCSI-2 hard drive
- VGA monochrome monitor
- 8 EISA expansion slots (7 open)
- 2 serial, 1 parallel, 1 PS/2 keyboard, 1 PS/2 mouse port
- 512KB of video RAM for Super VGA
- 384-watt power supply
- 1.44MB floppy disk drive
- Three 5.25" HH accessible bays
- Eight 3.5" hard disk bays
- Flash ROM BIOS
- TotalCare Service

\$5599



Z-SERVER 450DE Terrific value!

- Intel 50MHz i486DX — the fastest processor on the market!
- 8KB internal and 256KB write-back cache
- 8MB RAM expandable to 192MB
- 500MB SCSI-2 hard drive
- VGA monochrome monitor
- 8 EISA expansion slots (7 open)
- 2 serial, 1 parallel, 1 PS/2 keyboard, 1 PS/2 mouse port
- 512KB of video RAM for Super VGA
- SCSI cable/power distribution board included
- 384-watt power supply
- 1.44MB floppy disk drive
- Three 5.25" HH accessible bays
- Eight 3.5" hard disk bays
- Multiple security features
- LCD status display
- Flash ROM BIOS
- TotalCare Service

\$8499

For other configurations please call

Call 1-800-472-9234 today and see how your future is built-in!

Zenith Data Systems Brilliance Is Just A Phone Call Away!

A burst of ingenuity...from the company you know.

During the last decade, Zenith Data Systems has done more than manufacture one of the world's most extensive lines of desktop and portable computers. They've developed new technology such as the powersaving features used in the Z•NOTE. They've integrated the network capabilities required in a business environment. Zenith Data Systems protects your investment by building your future into every Z series system.

Redesigned ... refined ... and re-priced.

Everything is new about Zenith Data Systems' computers, including the way you'll get them — direct! At lower-than-ever prices. And usually within 48 hours. Just pick up the phone and place your order with a knowledgeable Zenith Data Systems professional.

To assure you of smooth operations, Zenith Data Systems' new Customer Assistance Center is on call with experienced, trained technicians to give you the solutions you need ... when you need them. Just call 1-800-CARE-360, 7am to 7pm (CST) weekdays. Almost any mystery can be solved with one quick phone call!

Your support doesn't stop there. TotalCare Service offers on-site service for desktops and monitors, and 48-hour Repair and Return service for portables. TotalCare Service protects your investment by minimizing downtime.



ZENITH DATA SYSTEMS

A Bull Company

To order, call
800/472-9234
or fax your order to
800/472-7211.

- 48-hour shipment available on preconfigured systems.
- Please call for information concerning other Zenith Data Systems notebook, desktop, server, and monitor products.

Terms

- MasterCard, Visa, Discover and American Express accepted. No surcharge for credit card orders.
- Money orders, certified checks, personal checks accepted (allow ten days for processing).
- Company and institutional P.O.'s upon credit approval. Prices do not include shipping and handling.
- Government, Educational, and Volume Purchase buyers please call for a quotation.
- Federal Government Sales please call 800/843-4131.

Warranty and Support:

- 1 year limited warranty on all systems, call for specific warranty information.
- Toll-free support from the Zenith Data Systems Customer Assistance Center (800/CARE-360 or 800/227-3360), 7am to 7pm CST, Monday through Friday.
- 1 year on-site service for desktops and monitors.
- 48-hour Repair and Return service for portables.
- See TotalCare contract for details.

Return policy:

- 30-day money-back guarantee.
- All returns must have RMA number issued by our Customer Service Department (800/CARE-360) and must be in original packaging, and include original invoice, warranty cards, and documentation.
- Zenith Data Systems is not responsible for typographical or photographic errors.
- All products are subject to availability.



Specifications and prices subject to change without notice. Banyan and VINES are registered trademarks of Banyan Systems Inc. IBM and PS/2 are registered trademarks of IBM. OverDrive is a trademark of Intel Corporation. Microsoft and MS-DOS are registered trademarks, and LAN Manager, Microsoft Mouse, and Microsoft Windows are trademarks of Microsoft Corporation. Novell and NetWare are registered trademarks of Novell Inc. TotalCare is a trademark of Bull HN Information Systems Inc.

Image-Editing Software

Image-Inc.

Image-In-Color, Version 3.0 Image-In-Color Professional, Version 3.0

BY BARRIE SOSINSKY
AND LORI GRUNIN

The design philosophy of Image-In-Color Professional (IP), \$795, and its scaled-down \$495 twin, Image-In-Color (IC), resembles the Microsoft Windows



GUI they run on: They are attractive to look at, are relatively easy to use, and have a lot of power under the hood. Both are suitable for novice users,

but with features such as color separation, advanced selection modes, and more special-effects filters, IP also targets a professional prepress audience. If your needs run more toward image manipulation than artistic expression, one of the Image-In products can fulfill them with aplomb.

The interfaces of both products are easy to use, with a logical, modular design. You can purchase raster-to-vector conversion (Image-InVect; \$149) and OCR (Image-InRead; \$149) modules, which were not tested for this review.

The toolbox for both products con-

SUITABILITY TO TASK				
Image-In-Color				
	POOR	FAIR	GOOD	EXCELLENT
Photo retouching	●	●	●	●
Creative editing	●	●	○	○
Hard-copy output	●	●	○	○
Electronic output	●	●	●	○

tains the usual array of tools, including selection, painting, and zoom. Each tool can be modified via a dialog box, which is accessed by clicking the right mouse button from anywhere on your screen. This makes it easy to work with large-screen image displays.

Most of the menu controls found in these dialog boxes allow you to preview a change before you effect it. Unlike

many of the other packages, you can still undo an operation even after you have deselected the tool; you can also disable undo to conserve memory. A Restore (revert) command lets you go back to the last-saved version of a file. You can save an individual selection to a file via a check box in the File Save dialog, but by doing it this way it's very easy to overwrite an image mistakenly with the selection.

IP provides excellent selection tools, including the unique ability to create a mask based on the intersection, combination, or subtraction of multiple selections. By using the polyline selection tool and the Add to selection option, we were able to get a perfect outline of a car and its shadow. Selections can be feathered but not smoothed by anti-aliasing (Version 3.1 will include this feature). IC's selection tools are less sophisticated; you lose the ability to combine selections. However, while IP has sophisticated selection tools, it has only basic masking capabilities: your selection area or its negative is your mask. This is far less flexible than the editable vector masks offered by Picture Publisher or the 8-bit gray bit-map masks used by PhotoStyler.

IP's paint tools offer much of the flexibility offered by the other high-end packages, including the ability to set opacity and to paint on darker, lighter, hue, and color only (these tools are not available in IC). You can

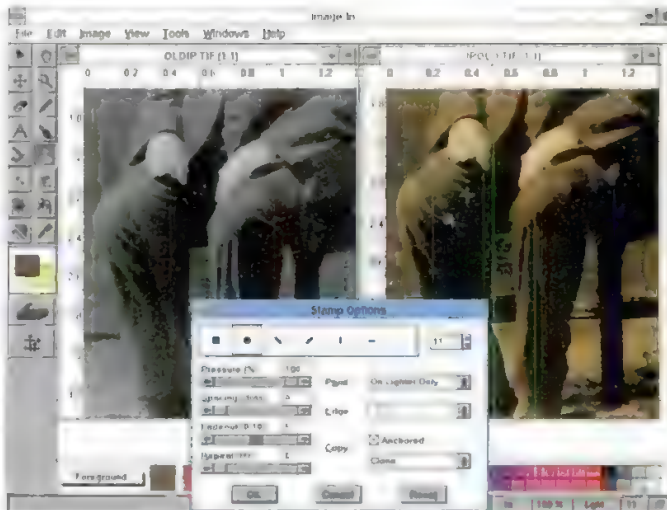
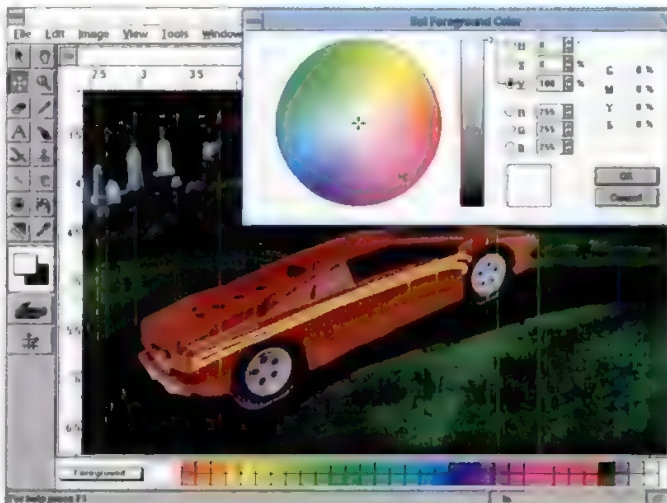


Image-In-Color Professional gives you tight control over the cloning tool. By setting the tool to use the soft edge, paint on lighter only, and fade-out options, we were able to repair the crease in the man's pant leg efficiently.

also set the amount of anti-aliasing you want along the edge of the paintbrush, although anti-aliasing isn't available for most other painting tools or text. The dialog boxes in which you choose these selections are well organized and easy to understand, which makes it easy to experiment with them.

IP also supports a Bezier curve drawing tool, but unlike the considerably more flexible one included in PixaFoto, you can specify only the thickness and color attributes (including opacity) of the brush to apply to it.

For the most part, color support is also



To create a pair of racing stripes across the side of the car, we used Image-In-Color Professional's Bezier curve tool. With this tool, fine-tuning the shape of the stripe was easier than drawing it with a freehand brush would have been. The lack of anti-aliasing controls, however, made it difficult to blend the car into the background smoothly.

■ Separation Anxiety

by Luisa Simone

Traditionally, professional service bureaus and prepress houses have been responsible for producing color-balanced CMYK film separations optimized for the printing process. An unwritten law stipulated that handling the intricacies of four-color separations required years of experience. Now desktop computers have put powerful separation tools into the hands of production managers, artists, designers, and even business users. But the incentives to produce four-color separations on the desktop—including lower costs and increased control compared with traditional methods—are offset by a steep learning curve.

We compared the three image-editing programs that have color-separation functions—Aldus PhotoStyler, Image-In-Color Professional, and Micrografx's Picture Publisher—with standalone separation programs for the PC—Inset Systems' HiJaak ColorSep, Ventura ColorPro, and Insight Systems' Publisher's Prism. Along the way, we discovered that no product provides all the features we consider important, although some come closer than others.

WHY SEPARATE?

A color-separation program must allow you to control the parameters that affect the conversion process from RGB to CMYK. For example, cyan, magenta, and yellow inks are not as pure as red, green, and blue screen phosphors, which makes it impossible to print rich, solid blacks. Color-separation programs compensate for this deficiency by generating a separate black component. The best programs allow you to determine how much color is removed from the cyan, yellow, and magenta printing plates through *under-*

color removal (UCR) and *gray-component replacement* (GCR) controls.

Of course, ink contamination affects the quality of all the colors in a picture, not just black. So look for programs that allow you to set color-absorption levels to compensate for the various levels of ink contamination you may encounter. Programs that can factor absorption into their calculations ultimately produce cleaner colors.

In order to generate separations optimized for a printing press, a program must handle basic parameters such as

that address the mechanical and physical limitations of the printing process. Dot-gain settings allow you to compensate for the fact that dots grow as ink soaks into absorbent paper. And programs that can establish ceilings for total ink density can keep your images from turning into a mess on press: There is a physical limit to the amount of ink any paper can hold. Finally, it's important to anticipate ink-plate alignment (*registration*) problems, which are commonly caused by vibrating machinery. Separation programs handle these slight

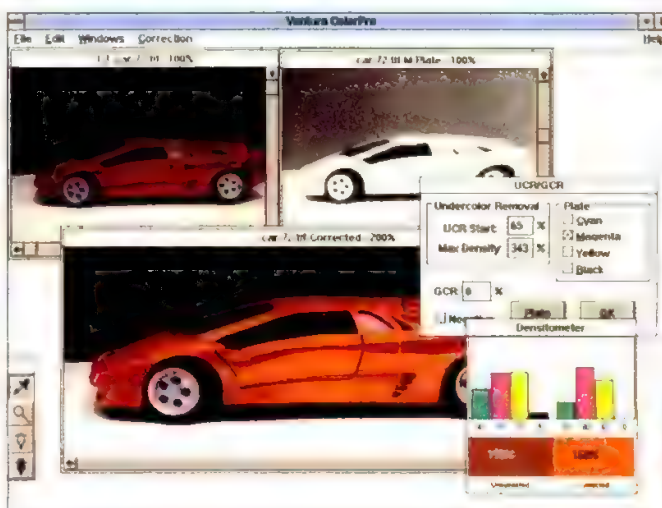
misregistrations between colors by controlling how images overlap. Traditional techniques include overprinting foreground elements on the background (*surprinting*), silhouetting elements to print against paper rather than over other colors (*knocking out*), and creating a slight overlap from lighter to darker colors so that any misalignment is hard to see (*trapping or choking*).

HOW IMAGE EDITORS STACK UP

The image-editing products all color correct images, so you can separate an RGB picture into CMYK and then work on each channel as an 8-bit gray-scale file.

Aldus PhotoStyler has only basic separation functions. You can determine screen frequency, dot shape, and screen angle. But preset levels for black generation (from 1 to 10) and a simple percentage value for under-color removal don't give you professional-level control over final output. PhotoStyler's approach does have one major advantage: It is simple enough for business users. For example, a straightforward text-entry box lets you limit ink coverage to between 200 and 400 percent.

Image-In-Color Professional ups the



Ventura ColorPro offers highly specialized tools to separate color images into DCS files, including electronic densitometer readings and UCR/GCR controls. The unusual toolbox (lower left) allows you to designate the highlight and shadow areas of your image. Notice both the on-screen representation of the magenta negative (top right) and a preview of how this picture will print using the current settings (bottom window).

dot shape, screen angle, and screen frequency (specified in lines per inch, or LPI). These settings control the pattern of dots, also called *halftones*, that allow colors to blend so that you are unaware of the individual dots forming the picture. And, of course, a separation program should let you specify film type, including whether the image will be positive or negative and whether the emulsion is up or down.

A separation program, however, should also contain more subtle controls

ante with its ability to correct for ink contamination as well as dot gain. Unfortunately, there is only a limited number of preset levels (3 for dot gain and 5 for GCR). In addition, you can access functions like GCR and UCR only when working in CMYK. Though this approach is technically correct, it increases your workload, because you then have to apply halftoning parameters to each channel.

Micrografx's Picture Publisher is the least expensive program of this group, yet it provides the most robust separation functions. Its UCR control gives you the ability to edit a gamma curve, so you can add more black to shadow areas and less to highlight areas. Likewise, the program's exceptional abilities to compensate for dot gain have real-world applicability. For example, you can set dot gain for each individual color—a boon when you consider the fact that magenta is usually the color that gains the most on press. And the ability to enter densitometer readings means that you can adjust dot gain for your particular output device.

Picture Publisher also supports the DCS (Desktop Color Separation) specification. (Image-In will add DCS support in a soon-to-be released upgrade, and Aldus plans to add it to the next version of PhotoStyler.) This modified PostScript format, developed for Quark Xpress on the Mac, contains five complete versions of a picture: cyan, magenta, yellow, black, and a low-resolution image for screen display and positioning. But generating a DCS file works only if your DTP program can pass the pre-separated data through to a PostScript printer or image setter.

TOOLS OF THE TRADE

Why would anyone need a dedicated color-separation program when image-editing software offers such powerful functions? Because image-editing programs can separate only bitmapped images. But HiJaak ColorSep (\$695; Inset Systems Inc.; Brookfield, Connecticut; 203-740-2400) and Publisher's Prism (\$495; InSight Systems; Vienna, Vir-

ginia; 800-688-0250) distinguish themselves by separating fully composed pages that include text and vector graphics as well as bitmapped images. Both ColorSep and Publisher's Prism require PostScript printer files as input. Their generic approach to separations means that you can create documents in different graphics programs, including DTP standards such as Aldus PageMaker or Ventura Publisher.

Both ColorSep and Publisher's Prism are intended for use by production managers or other professionals. Each product boasts film corrections based on densitometer readings and the ability to save reusable profiles. Despite the fact that Publisher's Prism ships a Microsoft Windows and a DOS version, both it and ColorSep display only text-based input screens; there is no visual feedback. Of course, the advantage is that neither program requires expensive hardware such as a high-resolution graphics adapter or a super-fast processor.

Significantly, these production-oriented programs are the only two that handle surprints and trapping. ColorSep's has simple on/off toggles to surprint black type, or trap colors to black lines. But power users will prefer Publisher's Prism's ability to trap to colors other than black and even generate proportionally sized traps.

Unlike the image-editing programs mentioned above, neither ColorSep nor Publisher's Prism is intended for color correction. ColorSep can adjust brightness and contrast, but to access UCR/GCR controls you must use the bundled HiJaak utility. In contrast, Publisher's Prism lets you directly set the threshold at which UCR will begin and the rate at which it will occur.

The big surprise was Ventura ColorPro (\$895; Ventura Software; San Diego, California; 619-673-0172), part of a new suite of programs that includes Ventura Separator (\$495) and Ventura Scan (\$295). Developed by PrePress Technologies (the marketer of SpectreSeps on the Mac), Ventura ColorPro can operate either as a standalone program

or as a module within Ventura Publisher. ColorPro is really a hybrid; it's a dedicated separation utility that outputs bitmapped images to DCS files. You still need Ventura Publisher to compose the images into complete pages, and Ventura Separator to produce the final individual printouts for cyan, magenta, yellow, and black.

ColorPro does an excellent job mimicking traditional prepress techniques. For example, the program contains an electronic densitometer that allows you to sample the value of any pixel in a picture. Specialized tools let you designate shadow and highlight areas and then use this information when you adjust tonal-range and gradation values.

Ventura ColorPro has the unique ability to display a screen image that reflects the current separation parameters. It was easy to see how the shadow areas in our test image would plug up on press. In addition to standard functions like UCR/GCR, ColorPro also offers global sharpening and smoothing filters, but only three preset levels to compensate for press gain. Though it takes some getting used to, the program's Ink Correction options are very powerful. You can adjust for ink contamination using both standard colors (like magenta) and hues picked directly from the current document. This immediate visual feedback is especially helpful for subtle colors such as skin tones.

Even with all three programs working together, there is no way to create traps (although Ventura Publisher can generate knockouts). But the synergy between ColorPro and Separator (which is easier to use and takes advantage of profiles created in ColorPro) gives business users a good shot at producing quality separations.

All of these color-separation programs can convert RGB data into individual CMYK files. But no program supplies automatic expertise in either color models or prepress technology. You still have to generate quality separations from your PC the old-fashioned way: by acquiring knowledge and experience through trial and error. □

Image-Editing Software

well implemented in both packages. Both products support both the RGB and HSV color models, and display these models in "visually correct" color pickers; for instance, when adjusting a Value in HSV

from the 24-bit spaces just described, but when you select a color, it is swapped into the 64-color palette on the main screen. This impedes the smoothness with which you can work.

IP also contains some basic separation controls, including both under-color removal and gray-component replacement for printed output, as well as some half-tone pattern adjustments. There are also tone curves for matching printer output to scanner input, a histogram of color values, and some minimal gamma correction to enable you to add more black to shadow areas and less to highlight areas. (For more on IP's color-separation capabilities, see the sidebar "Separation Anxiety.")

SURPRISING GAPS

While Image-In-Color Professional has a wealth of features, the program also exhibits some surprising holes in its functionality. For instance, almost no tools are available if you are working on a 256-color image. The one thing you do get when working on a 256-color image is an

SUITABILITY TO TASK				
Image-In-Color Professional				
	POOR	FAIR	GOOD	EXCELLENT
Photo retouching	●	●	●	●
Creative editing	●	●	●	○
Hard-copy output	●	●	●	○
Electronic output	●	●	●	○

on-screen 256-color palette, in contrast to the 64-color palette you see when working with a 24-bit image.

Similarly, while IP offers more than 20 filters, two important filters used for gray-scale editing—Despeckle and Sharpen—did not markedly improve an old damaged picture used in our tests. When we tried to clean up scanned half-tones for reprinting to a LaserJet, there were no tools suited to the task. Although you can write your own User filter as a mathematical matrix, the filters built into the package worked with only variable effectiveness.

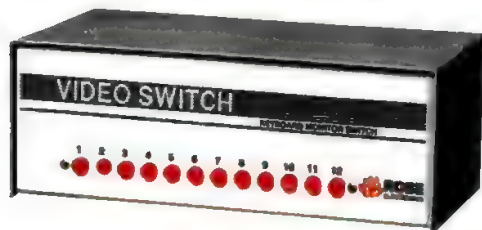
Although modifying an image can be clumsy, the tools needed are there for the

Image-In-Color Professional gives you sufficient leeway to experiment until you get it right—a critical feature for this class of software.

space, the color pickers show the progressively larger circles that represent the cross-section of the space at different saturation levels. Unfortunately, there is no continuous-tone color picker as part of your on-screen palette: You can choose

Your Choice of Keyboard Monitor Switches

Access multiple computers with a single keyboard and monitor to cut equipment costs, save valuable space, and end clutter



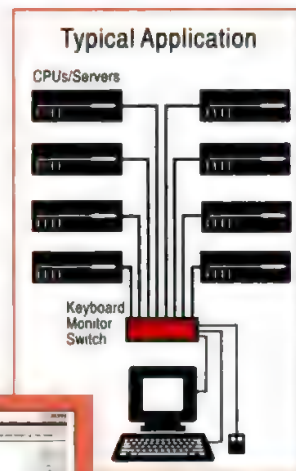
Manually controlled unit

- Simple pushbutton operation for quick selection
- Four, eight, or twelve ports per unit
- Daisy-chaining connects unlimited number of CPUs
- Compatible with EGA, VGA, Macintosh, Sun, and others
- Optional keyboard booting for 286, 386, and 486
- Optional RS232 or PS/2 mouse interface
- PCB construction for high reliability and low crosstalk
- Rack mount, matrix, and customized units available

- Switch by keystroke, from front panel, or RS232 port
- Two or four ports per unit
- Cascade units to support up to 255 CPUs
- Supports monochrome, EGA, and VGA
- Includes keyboard booting for 286, 386, and 486
- Includes RS232 and PS/2 mouse interface
- LEDs display selected CPU and CPU power-on
- Scan function switches among CPUs automatically



Keyboard controlled unit



Call toll-free now for your copy of our Switching and Sharing Solutions catalog.

Other Rose products: Print servers, printer sharing units, print buffers, keyboard monitor extenders, video splitters. All Rose products are US-made and have a 1-year warranty.

Make the Rose Connection

10850 Wilcrest Drive • Houston, Texas 77099 • Phone (713) 933-7673 • Fax (713) 933-0044

CIRCLE 290 ON READER SERVICE CARD



1-800-333-9343

job. The program gives you sufficient leeway to experiment until you get it right—a critical feature for this class of software. A status bar at the bottom of the screen tells you what the program is doing, how far along it is, and how long it is going to take to get the job done. You need that feedback, because some complex operations can take a long time to process. On our tests, resizing a portion of a 24-bit 300-dpi image took so long, we thought the application had hung. Some, but not all, operations can be aborted with the Esc key.

Novice users will not be intimidated by either of these products, but they will not be particularly well served by the documentation. (Both Image-In-Color Pro-

U-Lead Systems Inc.

ImagePals, Version 1.0

BY LORI GRUNIN

ImagePals may not be the product of choice if your sole interest is editing images. But if you need a well-rounded toolkit of programs to manage, capture, and manipulate images, you can't do much better than U-Lead Systems' Microsoft Windows-based \$249 packaged trio of utilities.

The image-editing module, Enhancer, provides more than just basic image-processing features—global filters and colormap enhancement—but with limited selection and paint tools, it falls far short of the other products reviewed here when it comes to the rest of an image-editor's toolkit. On the positive side, it does include an easy-to-use stitching module for devotees of hand scanners.

And unlike PhotoFinish, ImagePals had no problems handling large images (although it did slow down quite a bit).

While there is the usual set of rectangular, elliptical, free-form, and magic wand selection tools, you can determine only the basic attributes of any selection. But you do have the ability to expand the border of the selection. We took advantage of this useful feature as the first step in creating the frame around the antique photo; we then used the Emboss filter to give it a three-dimensional effect.

You can move a selection marquee, but when you move even a nonrectangular selection, you see only a rectangular bounding box. This made it especially difficult to place the car accurately on the background in our test image. Once we placed the car, the lack of any sort of anti-aliasing or

SUITABILITY TO TASK

ImagePals

	POOR	FAIR	GOOD	EXCELLENT
Photo retouching	●	●	○	○
Creative editing	●	○	○	○
Hard-copy output	●	●	○	○
Electronic output	●	●	●	●

feathering left us with a ragged outline around it.

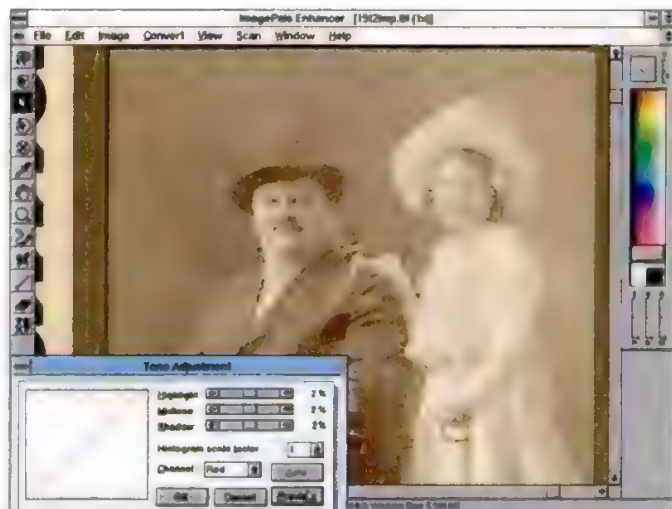
The program has a bare minimum of painting tools: a freehand brush, an airbrush, and a line tool. To create the road, for instance, we had to use the freehand selection tool, then choose Fill from the

Edit menu (there isn't even a paint bucket tool). Cleaning up the antique photo proved especially difficult because of the lack of a clone tool; instead of cloning along the crease (the typical procedure), we had to select successive small areas and use the Average filter to

smooth out the artifacts.

CAPTURE AND ORGANIZE

While its image-editing skills aren't quite up to those of its low-cost competitor, PhotoFinish, the immensely useful Capture and Album modules keep ImagePals in the running. You create an album by importing files into it, selecting them either file by file or by path; Album then generates thumbnails of each image that



To create a sepia tone for the gray-scale photograph, we first converted it to RGB, then used ImagePals' flexible and well-designed Tone Adjustment controls to increase or decrease the tonal range in the individual red, green, and blue channels.

FACT FILE

Image-In-Color, Version 3.0 Image-In-Color Professional, Version 3.0

Image-In Inc., 406 E. 79th St., Minneapolis,
MN 55420; 800-345-3540, 612-888-3633;
fax, 612-888-3665

List Price: Image-In-Color, \$495; Image-In-Color Professional, \$795

Requires: 2MB RAM, DOS 3.3 or later, Microsoft Windows 3.x. 386-based PC or better, 4MB RAM recommended

In Short: Image-In-Color Professional has most of the features you'd expect in a midrange image-editing package, including a Bezier curve tool and Boolean operations for selection areas. But as with its lower-priced, less versatile sibling, Image-In-Color, the implementation of the tools tends to be erratic



ON READER SERVICE CARD

fessional and Image-In-Color use the same documentation: IP-specific commands are noted as such.) Although there is a tutorial, it isn't explicit enough to be of value. The manual is written in a reference form, organized by menu commands: It is features- but not benefit-oriented.

By the time you read this, Version 3.1 of both products, which will include JPEG compression, Kodak PhotoCD support, selection anti-aliasing, and some new color-device support, should be shipping. Currently, you can do almost anything you want in these programs, but they make you work harder than the competition.

Windows is now under new management.

Sure, Windows is great. Except that you can spend more time managing your desktop than actually working on it.

But with our new Rooms for Windows software, working in Windows is now much easier.

Rather than working with all your files and applications crammed into one screen, Rooms lets you set up an unlimited number of desktops, or Rooms. Each with its own combination of applications and files, arranged on the screen however it makes the most sense to you.

Simply by pointing and clicking, you can move from Room to Room and between Windows and DOS programs. And all your files and applications stored in all your Rooms can open automatically, every time you turn on your PC!

Rooms for Windows. You'll wonder how you ever managed without it.

To purchase Rooms for Windows, visit your nearest dealer or call 1-800-626-6775. In Canada call 1-800-668-0199. In Quebec call 1-800-668-0133. Suggested retail price \$99.

Xerox
The Document Company



■ Mac Hegemony

by Pauline Ores

Having an older sibling has its advantages. You learn what to expect, what to avoid, and how to get by as you watch him undergo various rites of passage. But even though the PC has learned the benefits of a graphical environment from Apple's Macintosh, it still hasn't attained the maturity of its older brother in some areas, especially in image-editing software.

The two Mac applications that serve as standard-bearers for the category, Adobe Photoshop and Fractal Design's ColorStudio, enjoy some advantages that stem just from being first: more time to outgrow embarrassing first versions, to cultivate relationships with third-party software developers, and to enhance feature sets.

Although Photoshop (\$895) is more widely known than ColorStudio (\$795), it is hard to pin down any major differences between the two. Photoshop is more popular and is generally perceived as an easier-to-use, more mainstream product, although it offers some features PC users don't think of as "mainstream," such as the ability to create and save masks as editable, vector files. ColorStudio's stronger RGB-to-CMYK conversion, Shapes add-on program (which allows you to bring a PostScript file into ColorStudio on a separate layer, manipulate it, and then render it into the image), superior text handling, and ability to pull images off nine-track tape make it the high-end standard.

MORE THAN JUST A FEATURE WAR

PC programs, of course, are no strangers to feature overload; unfortunately, they can't seem to support the same features at the same level of performance. While Microsoft Windows and Presentation Manager give the PC the interface and API (application programming interface) necessary for graphics work, they fall short in some significant ways.

The current incarnation of the Mac's operating system API, 32-bit QuickDraw, supports not only 32-bit addressing (as does OS/2), but 32-bit color at a reasonable speed. While 32-bit color support may seem like a frill, it's really a performance enhancer. 32 bits of color is *not* 2³² colors. It's 24 bits of color with 8 bits left undefined; these undefined bits are generally used for transparency and mask information. This channel allows the Mac's operating system to handle image data in an off-screen buffer, copy it to the screen, and image it at the proper bit depth. Conversely, on the PC, when you create a mask, the application must handle all the pixel manipulation.

Similarly, although Windows 3.x provides a more robust and capable environment for graphics than the PC has ever known, it still faces problems. For instance, it has a limitation on the number of memory objects available for an application to allocate. So if an application needs a large amount of memory, it must allocate a few large blocks (in order to use fewer objects), rather than many small ones. The application must then subdivide each of the large blocks into appropriate sizes, and handle the memory management itself.

Having started out as a graphics machine, the Mac has always concerned itself with the level of performance needed for graphics operations; the result is the Nubus 32-bit I/O architecture as well as accelerated graphics adapters that support 32-bit color. While the EISA supports 32-bit I/O on the system bus, few vendors rushed to develop graphics adapters that support it. Only recently have we seen a ground swell of accelerated 24-bit graphics controllers for the PC.

CRITICAL MASS

The PC platform does offer some advantages, however, as demonstrated by the stampede of applications ported from the Mac. But these advantages

tend to be influenced more by economies of scale than by technology. For instance, there are far more color-capable PCs out there than similarly-equipped Macintoshes. Furthermore, ISA graphics adapters are going up in resolution, colors, and speed even as they (and the systems they inhabit) go down in price. Although Apple has recently dropped prices, it still costs only half as much to put together the components needed for an image editing-capable PC.

The PC applications are all quite new and still lack the prepress advantage of their older Mac siblings. But the market is changing, and image manipulation is no longer only for sophisticated desktop publishers and prepress production houses. The release of the Kodak PhotoCD hardware to photo-finishing shops—where you'll be able to get 24 images scanned at high resolution and put on a CD for \$20 (as opposed to paying anywhere from \$30 to \$100 for a single color-corrected scan)—is bound to change the balance between the high-end prepress and low-end home user. It is likely that new users won't place the same demands on image-editing software.

The directions Microsoft and Apple have taken for enhancements to their system software will make a big difference in the quality of the next generation of applications for each platform. QuickDrawGX, the forthcoming version of the Mac operating system graphics API, takes a giant step beyond the current Windows GDI: It provides an entirely new variety of graphic primitives, including quadratic Bezier curves, cursor detection, a line-layout manager (which handles functions such as fitting text to a curve), as well as pseudo three-dimensional capabilities.

The next version of the Windows GDI, not expected to be released until some time in 1993, adds Bezier handling to its list of functions, but the rest of its additions—including 32-bit I/O operation—are only attempts to play catch-up with the current state of the Mac's System 7.x. □

DELL INTRODUCES A CONCEPT SO IT BREAKS EVERY LAW IN

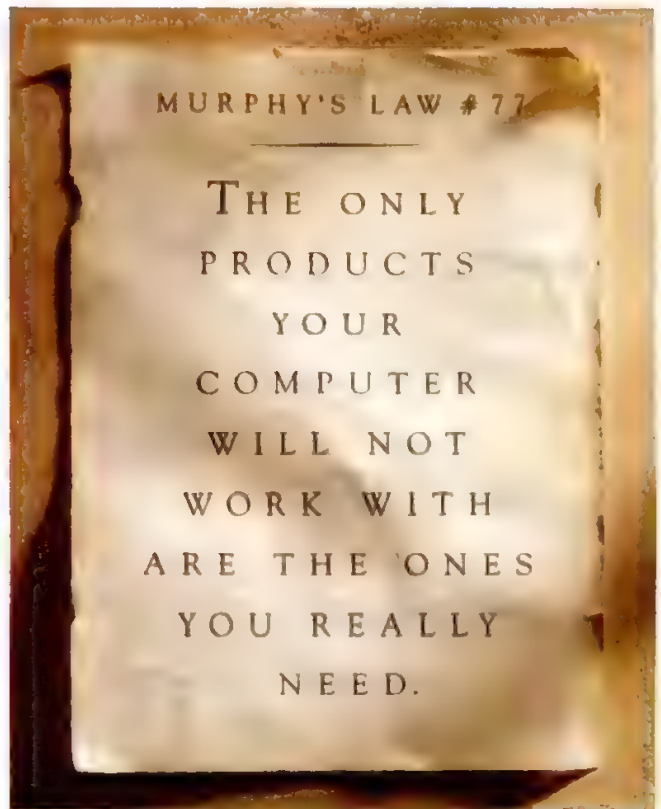
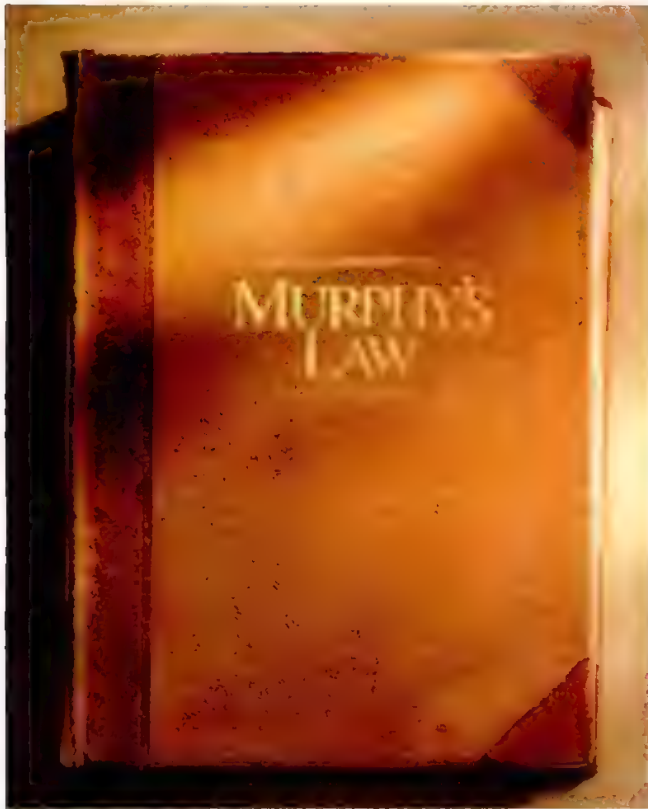


We've added services to help you get the most out of your computer.

If something can go wrong, it will. That's a law so fundamental, it's practically built into every brand of computers on earth. Fortunately, you've told us how to make it better. In millions of conversations with our customers, we discovered it's not just a great computer you want; it's how to get the most out of it.

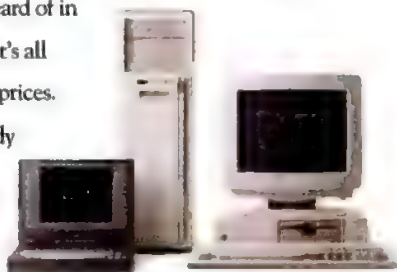
INTRODUCING GUARANTEED COMPATIBILITY:

Dell® systems are designed and extensively tested to run all standard operating systems, application software, peripherals and network operating systems developed for ISA and EISA architecture systems. If you encounter a compatibility problem with your Dell Performance Series system anytime within three years after the original purchase,



So we made substantial additions to our entire line of acclaimed computers to help you get more out of them now, and in the future. We added services, specialists, and in the three areas where you most want assurances — compatibility, quick answers and fast service — we're adding something unheard of in computers: guarantees. And it's all available at Dell's new lower prices.

It should make everybody happy. Except maybe our competitors. And Murphy.



we guarantee that Dell's engineers and technicians will work with you to identify the cause of the problem and recommend a solution. If the problem (other than software support for device drivers) can be solved by updating your system, we will provide you the change at no charge. Or, in the rare event we can't do that, you may return the system for a refund. You understand, of course, that we can't extend the guarantee to software or devices that were never intended to run on comparable ISA or EISA systems of the same vintage.¹



We guarantee we'll work with you to ensure compatibility with future products.

¹Refund value is based on the sum of years digits depreciation of the original purchase price over a three-year period, calculated monthly. Refund offer is valid for registered owners of Dell Performance Series systems purchased after July 1, 1992. Guarantee not applicable outside the U.S. and subject to change without notice. This guarantee applies to registered owners of Dell Performance Series systems purchased after July 1, 1992, but only one award per system per day. Please understand that the guarantee does not apply to support calls missed for reasons clearly outside of our control, such as power outages and interruptions to telephone service, or outside the U.S. Subject to change without notice. This guarantee applies to registered owners of Dell Performance Series systems purchased after July 1, 1992. Please understand that the guarantee does not apply to service calls missed for reasons clearly outside of our control, such as interruptions to telephone service and the closure of airports required for parts delivery; or outside the U.S. Subject to change without notice.

REVOLUTIONARY, THE BOOK.

INTRODUCING GUARANTEED RESPONSE: When you call Dells technical support center with a problem during operating hours (6AM-12 Midnight CT daily)*, you will talk to a technical specialist within 5 minutes. If you do not wish to hold for a technician, your call will be promptly returned by a technical specialist within one hour. In the rare event you don't reach a technician or a technician

INTRODUCING GUARANTEED NEXT-BUSINESS-DAY SERVICE:

If there's a hardware failure with your Dell system while under a service contract purchased from Dell and you notify us before 5:00 PM CT, a technician, if needed, will arrive by the end of the next business day.²

In the rare event the technician doesn't arrive, your situation will receive top priority, plus you will receive an additional month of service at no cost.³ (By the way, the first year's service is included in the Dell system price.)

And now, the final guarantee: a 30-day, no-questions-asked, money-back guarantee with each Dell computer.



*A technician
will come by
the end of the next
business day.*

MURPHY'S LAW # 13

THE MORE
DESPERATE
YOUR PHONE
CALL, THE
LONGER YOU
WILL BE PUT
ON HOLD.

MURPHY'S LAW # 34

THE MORE
URGENT THE
PROBLEM,
THE LONGER
IT WILL
TAKE FOR
SERVICE.

doesn't call back within one hour, let us know and you will receive your choice of a check for \$25 or a credit of \$25 toward your next purchase.²

Now, the price of your system includes this toll-free phone support mentioned in the above guarantee for as long as you own your computer. We'll solve most reported problems over the phone, usually in 10 minutes or less.

We also have a toll-free Getting Started Helpline, 24 hour-a-day system information via our TechFaxSM line and our own Dell Forum on CompuServe's Information Service.



*We solve most problems
over the phone
within 10 minutes*

Our philosophy of putting your problems before our rules is why two-thirds of the FORTUNE 500[®] buy Dell systems. It's a philosophy that's made us an \$890 million company. And it's a philosophy we'll continue. We guarantee it.

DELL

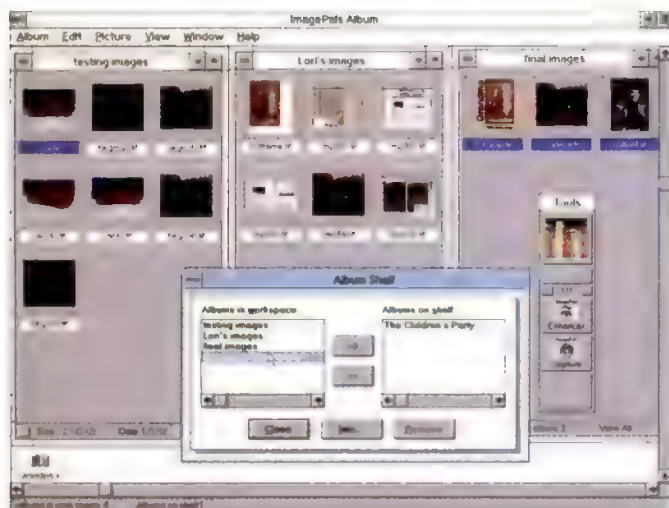
800-528-6305

WHEN CALLING, PLEASE REFERENCE #11BY3.

HOURS: 7AM-9PM CT MON-FRI, 8AM-4PM CT SAT, 10AM-3PM CT SUN.
IN CANADA, CALL 800-668-3021. IN MEXICO CITY, 250-7111

*Leasing arranged by Leasing Group, Inc. *Service provided by BancTec Service Corporation. On-site service may not be available in certain remote locations. i386, 486 and the Intel Inside Logo are trademarks of Intel Corporation. Microsoft and MS-DOS are registered trademarks and Windows is a trademark of Microsoft Corporation. Lotus is a registered trademark of Lotus Development Corporation. FORTUNE 500 is a registered trademark of The Time Inc. Magazine Company. Dell disclaims proprietary interest in the marks and names of others. ©1992 Dell Computer Corporation. All rights reserved.

Image-Editing Software



During testing, we used ImagePals' Album to track the original, work-in-progress, and final versions of our image files, as well as to perform batch conversions of screenshots to different file formats. To load several images into the Enhancer module simultaneously, you simply select the desired images and drag them to the Enhancer icon.

take up about 3K of disk space. You can then attach a note or a label to each thumbnail, which you can search on, or a bookmark, which you can jump to. Thumbnails can be sorted and searched on a variety of criteria, including file size and type.

In addition to managing thumbnails of images, you can also delete, copy, rename, move, convert, view, and print the original images; most of these operations can be done in groups. A Backup command allows you to archive an album to floppy disk.

For all its elegance, the Album does have flaws worth noting. First, the largest thumbnail size is still a bit too small when you're running at 1,024-by-768 resolu-

tion. The second flaw, which may also be a function of the small thumbnail size, is that the thumbnails appear unusually dark, even though the monitor gamma setting in the Album is the same as the one in the Enhancer.

Unfortunately, if you move a file without using the program, the links connecting the thumbnails to the images are severed, with no easy way to reconnect them—an annoy-

ing shortcoming. The program would additionally benefit from the ability to check user-specified paths upon loading and album, and subsequently generate new thumbnails automatically. Similarly, the flexibility of the Capture module rivals that of HALO Desktop Imager, our Editors' Choice for Windows image-capture and conversion software ("Capture and Conversion the Windows Way," June 16, 1992). You can capture any area of the screen to any destination (file, clipboard, or printer), with any cursor type, with any delay (instantaneous, specific delay, or continuous capture). The program can also capture an icon, cursor, or bitmap directly from an application's executable file. You control the program via drop-down menus from the menu bar or from an optional ribbon bar. If you want to spruce up your screenshots, Capture gives you the ability to pad the screenshot with the background color, add a frame, and add a drop shadow.

We used Capture to take ImagePals' screenshots for this story, as well as to capture various parts of the screen as a form of visual note taking during the evaluation process. Our only disappointment with the Capture utility was its inability to capture DOS screens of any sort, even if they are running in a window.

ImagePals Enhancer is an unsophisticated program lacking many basic image-editing tools. But the elegant and flexible Album and Capture programs more than make up for its flaws, rendering this a truly useful graphics utility package.

ZSoft Corp.

PhotoFinish, Version 1.01 Publisher's Paintbrush, Version 2.02

BY LANCE ULANOFF

What's the difference between ZSoft Corp.'s Publisher's Paintbrush and its newer product, PhotoFinish? About \$300, and a shift of emphasis from power features to usability.

Although ZSoft has targeted Publisher's Paintbrush (\$495) to the sophisticated image processor, and PhotoFinish (\$199) to the general business user,



PhotoFinish actually has more flexibility, ease of use, and raw power than its older, more expensive sibling. The company does plan to release a new version of Publisher's Paintbrush that should incorporate the most powerful tools that are included with PhotoFinish. For

now, PhotoFinish represents the best that ZSoft has to offer in image-editing software.

Both PhotoFinish and Publisher's Paintbrush share an almost identical, uncluttered interface, which features a

SUITABILITY TO TASK

PhotoFinish

	POOR	FAIR	GOOD	EXCELLENT
Photo retouching	●	●	●	●
Creative editing	●	●	●	○
Hard-copy output	●	●	○	○
Electronic output	●	●	●	○

button toolbar that can be expanded or condensed to show icons for specific groups of tools. In PhotoFinish, most of the major special-effects filters and tools are represented as freehand tools on the toolbar, allowing you to spend as little time as possible hunting through pull-down menus.

FACT FILE

ImagePals, Version 1.0

U-Lead Systems Inc., 970 W. 190th St., #520, Torrance, CA 90502; 800-858-5323, 310-523-9393; fax, 310-523-9399

List Price: \$249.

Requires: 2MB RAM, 8MB hard disk space, DOS 3.0 or later, Microsoft Windows 3.x.

In Short: While ImagePals' image-editing capabilities don't match those of its less expensive rival, PhotoFinish, its excellent image-capture and management tools alone are worth the price.



EIGHT EXCEPTIONS TO MURPHY'S LAW.

DELL 325SX i386™SX

25 MHz SYSTEM

- 2 MB RAM
- 80 MB (17 ms) IDE HARD DRIVE
- VGA 800 MONITOR (14", 800 x 600, .39mm)
- ONE FLOPPY DRIVE (3.5" OR 5.25")
- MS-DOS® 5.0

NOW ONLY \$1,149

LEASE: \$43/MO.



DELL 486P/25 i486™SX 25 MHz SYSTEM

- 4 MB RAM
- 120 MB (17 ms) IDE HARD DRIVE
- UPGRADEABLE PROCESSOR
- SUPER ACCELERATED VIDEO CONTROLLER
- SUPER VGA 1024i MONITOR (14", 1024 x 768, .28mm)
- ONE FLOPPY DRIVE (3.5" OR 5.25")
- MS-DOS 5.0

NOW ONLY \$1,899

LEASE: \$70/MO.



DELL 486P/33 i486DX

33 MHz SYSTEM

- 4 MB RAM
- 170 MB (17 ms) IDE HARD DRIVE
- SUPER ACCELERATED VIDEO CONTROLLER
- SUPER VGA 1024i MONITOR (14", 1024 x 768, .28mm)
- ONE FLOPPY DRIVE (3.5" OR 5.25")
- MS-DOS 5.0

NOW ONLY \$2,199

LEASE: \$81/MO.



DELL 486P/50 i486DX2

50 MHz SYSTEM

- 4 MB RAM
- 230 MB (16 ms) IDE HARD DRIVE
- SUPER ACCELERATED VIDEO CONTROLLER
- ULTRASCAN™ 14C MONITOR (14", 1024 x 768, .28mm, NON-INTERLACED)
- ONE FLOPPY DRIVE (3.5" OR 5.25")
- MS-DOS 5.0

NOW ONLY \$2,599

LEASE: \$96/MO.



DELL 486D/50 i486DX2

50 MHz SYSTEM

- 4 DRIVE BAYS, 6 ISA SLOTS
- 8 MB RAM
- 230 MB (16 ms) IDE HARD DRIVE
- SUPER ACCELERATED VIDEO CONTROLLER
- ULTRASCAN 15FS MONITOR (15", 1024 x 768, .28mm, NON-INTERLACED)
- ONE FLOPPY DRIVE (3.5" OR 5.25")
- MS-DOS 5.0

NOW ONLY \$3,149

LEASE: \$117/MO.



DELL 466DE i486DX2

66 MHz EISA SYSTEM

- 4 DRIVE BAYS, 6 EISA SLOTS
- 8 MB RAM
- 230 MB (16 ms) IDE HARD DRIVE
- ULTRA ACCELERATED VIDEO CONTROLLER
- ULTRASCAN 15FS MONITOR (15", 1024 x 768, .28mm, NON-INTERLACED)
- ONE FLOPPY DRIVE (3.5" OR 5.25")
- MS-DOS 5.0

NEW ONLY \$3,899

LEASE: \$140/MO.



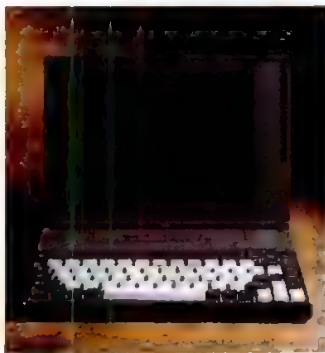
DELL 320SLi i386SL

20 MHz 3.6 LB. NOTEBOOK

- 2 MB RAM
- 60 MB (19 ms) IDE HARD DRIVE
- REFLECTIVE VGA LCD (9.5", 640 x 480)
- UP TO 4-HOUR BATTERY LIFE
- MS-DOS 5.0/MICROSOFT® WINDOWS™ 3.1/LOTUS® ORGANIZER/DELL KEYBOARD MOUSE

NOW ONLY \$2,149

LEASE: \$80/MO.



DELL 325NC i386SL

25 MHz COLOR NOTEBOOK

- 4 MB RAM
- 80 MB (19 ms) IDE HARD DRIVE
- VGA COLOR LCD (9", 640 x 480)
- 7.1 LBS. INCLUDING BATTERY
- 3-HOUR BATTERY LIFE
- MS-DOS 5.0

NEW LOW PRICE \$2,899

LEASE: \$107/MO.



DELL™

800-528-6305

WHEN CALLING, PLEASE REFERENCE #11BY3.

HOURS: 7AM-9PM CT MON-FRI, 8AM-4PM CT SAT, 10AM-3PM CT SUN
IN CANADA, CALL 800-668-3021 IN MEXICO CITY, 250-7111



CIRCLE 166 ON READER SERVICE CARD

Save Disk Space



PKZIP version 2.0

PC WORLD



WORLD CLASS
AWARD

"PKZIP is the undisputed champion of data compression" - BYTE Magazine

"It [PKZIP] combines blazing decompression times and excellent compression speed" - PC Magazine

PKWARE introduces the next generation of its award winning compression utility, giving even greater performance levels than achieved with previous releases of the software. PKZIP compresses and archives files, saving disk space and reducing file transfer time.

Software developers, you can significantly reduce product duplication costs by decreasing the number of disks required to distribute your applications. Call for Distribution License information.

Put Your Executables on a Diet

PKLITE increases your valuable disk space by compressing executable (.EXE and .COM) files by an average of 45%. The operation of PKLITE is transparent, all you will notice is more available disk space!



Software Developers, save disk space and media costs with smaller executables. You can distribute your software in a compressed form with PKLITE Professional. PKLITE Professional also gives you the ability to compress files so that they cannot be expanded, hindering reverse engineering of your programs.

PKWARE[®] INC.

9025 N. Deerwood Drive Brown Deer, WI 53223
(414) 354-8699 Fax (414) 354-8559

PKZIP \$47.00 PKLITE \$46.00 PKLITE Professional \$146.00
Please add \$3.50 S&H per package in the US & Canada, \$5.00 overseas.
Wisconsin residents add 5% state sales tax & applicable county sales tax.
Visa and Mastercard accepted, no COD orders.

PC-9/92

Both packages utilize a color palette from which you can select primary, secondary, and background colors; a tool width and shape box that lets you easily adjust tool size; and a status bar that displays the name of a tool when you are on top of it, but annoyingly drops the description as soon as you move back onto the image area. The change tool-width box proved especially useful when we decided to resize the cloning tool in the midst of cloning portions of the antique photo.

There is also a button in the tool-width box that lets you select and change brush shape on the fly. The corresponding button on Publisher's Paintbrush's width box is an exercise in redundancy: It simply brings up a more involved tool-width dialog box.

The tools that PhotoFinish offers are more sophisticated than those of Publisher's Paintbrush. Unlike Paintbrush, PhotoFinish offers "visible cursors" that let you see the exact area your tool will affect.

This metaphor is carried out splendidly with the cloning tool. Once you have selected the original image or area to clone from and click on the area to clone to, a replica of your image-tool edit area glides over the original, showing you exactly what areas you're cloning. In addition, you can clone across images. This feature proved useful during the extensive clone operation we performed to transfer the people from the antique photo to an entirely new background in another window.

SUITABILITY TO TASK				
Publisher's Paintbrush				
	POOR	FAIR	GOOD	EXCELLENT
Photo retouching	●	●	●	○
Creative editing	●	●	●	○
Hard-copy output	●	●	○	○
Electronic output	●	●	●	○

The duplicate feature that is provided with PhotoFinish is also quite a handy one. For example, if you want to blend one image into another seamlessly, you can use duplicate to open a second file image, zoom up to 1,600 percent on the working image, and watch the results on the unzoomed copy as you continue to work.

STATISTICA/W

Windows
DOS, Macintosh

STATISTICA/W™ (for Windows) Complete Statistical System with thousands of on-screen customizable, presentation-quality graphics fully integrated with all procedures ■ Complete Windows 3.1 support, DDE, OLE, TT-fonts, multiple toolbars, right mouse button support ■ Unlimited numbers of data-, results-, and graph-windows ■ Inter-window integration: data, results, and graphs can be treated as objects and converted into one another in a number of ways ■ The largest selection of statistics and graphs in a single system; comprehensive implementations of: Exploratory techniques; multi-way tables with banners (presentation-quality reports); nonparametrics; distribution fitting; multiple regression; general nonlinear estimation; stepwise logit/probit; general ANCOVA/MANCOVA; stepwise discriminant analysis; log-linear analysis; factor analysis; cluster analysis; multidimensional scaling; canonical correlation; item analysis/reliability; survival analysis; time series modeling; forecasting; lags analysis; quality control; process analysis; experimental design (with Taguchi); and much more ■ Manuals with comprehensive introductions to each procedure and examples ■ Hypertext-based Stats Advisor expert system ■ Extensive data management facilities (spreadsheet with long formulas, block operations, advanced Clipboard support, DDE hot links, relational merge, data verification, powerful programming language) ■ Batch command language and macros also supported, "turn-key system" options ■ All output displayed in Scrollsheets™ (dynamic, customizable, presentation-quality tables with toolbars, pop-up windows, and instant 2D, 3D and multiple graphs) ■ Extremely large analysis designs (e.g., correlation matrices up to 32,000x32,000, unlimited ANOVA designs) ■ Megabyte Manager with up to 32,000 variables (8 Mb) per record ■ Unlimited size of files; extended ("quadruple") precision; unmatched speed ■ Exchanges data and graphs with other applications via DDE or an extensive selection of file import/export facilities ■ Hundreds of types of graphs, including categorized multiple 2D and 3D graphs, matrix plots, icons, and unique multivariate (e.g., 4D) graphs ■ Facilities to custom design new graphs and add them permanently to menu ■ On-screen graph customization with advanced drawing tools, interactive stretching and resizing of complex objects, interactive embedding of graphs and artwork, special effects, icons, maps, multi-graphics management, page layout control for slides and printouts; unmatched speed of graph redraw ■ Interactive rotation, perspective and cross-sections of all 3D and 4D graphs ■ Extensive selection of tools for graphical exploration of data: fitting, smoothing, overlaying, spectral planes, projections, layered compressions, marked subsets ■ Price \$995.

Quick STATISTICA/W™ (for Windows) A comprehensive selection of basic statistics and the full graphics capabilities of STATISTICA/W ■ Price \$495.

STATISTICA/dos™ (for DOS) A STATISTICA/W-compatible data analysis system ■ Price \$795.

Quick STATISTICA/dos™ (for DOS) A subset of STATISTICA/dos statistics and graphics ■ Price \$295.

Domestic sh/h \$10 per product; 14-day money back guarantee.

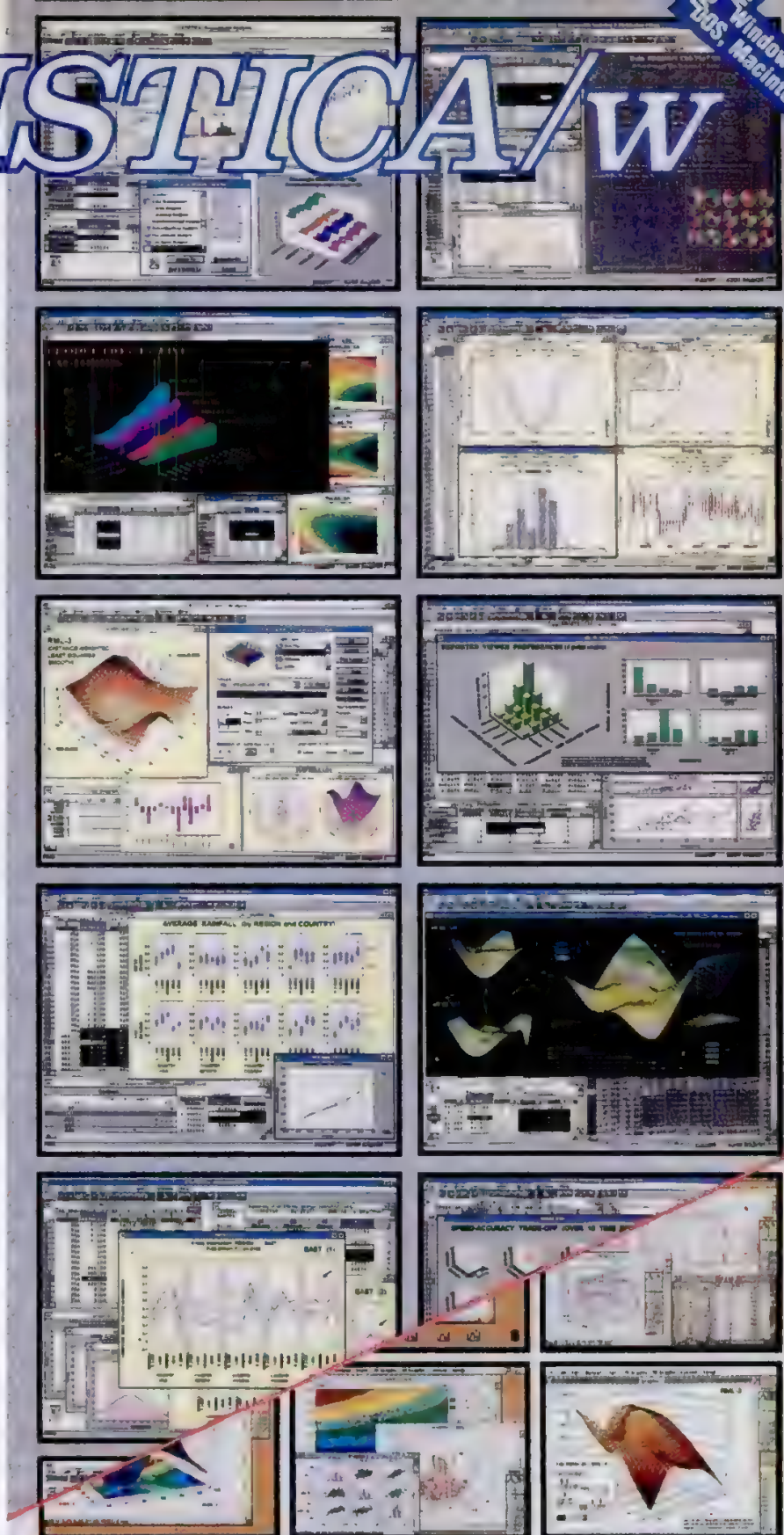
CIRCLE 057 ON READER SERVICE CARD FOR IBM
CIRCLE 059 ON READER SERVICE CARD FOR MAC

StatSoft™

2325 E. 13th St. • Tulsa, OK 74104 • (918) 583-4149
Fax: (918) 583-4376

Overseas Offices: Statsoft of Europe (Hamburg, FRG), ph: 040 4200347, fax 040 4911310. StatSoft UK (London, UK), ph 0462 482822 fax 0462 482855. StatSoft Pacific (Melbourne, Australia), ph: (03) 663 6580, fax: (03) 663 6117. StatSoft Canada-CCO (Ontario), ph 416 849 0737, fax 416 849 0918. Available From: CORPORATE SOFTWARE and other Authorized Representatives Worldwide. Holland: MAB Julsing, 071-230410, France: Version US (1), 40590913. Sweden: AkademData 018-240035. Hungary: Dagent Kft 186 5782. Belgium: TEXMA 10 61 16 28. South Africa: Osins 12 663-4500. Japan (Macintosh): Three's Company, Inc. 03-3770-7600. Japan (DOS and Windows): Design Technologies, Inc. 03-3667-1110.

StatSoft, STATISTICA/W, Quick STATISTICA/W, STATISTICA/Mac, Quick STATISTICA/Mac, STATISTICA/DOS, Quick STATISTICA/DOS and Scrollsheet are trademarks of StatSoft, Inc.



STATISTICA/Mac™ (for Macintosh) A STATISTICA/W-compatible, comprehensive data analysis and graphics system designed for the Macintosh ■ Large selection of statistical methods fully integrated with presentation-quality graphics (incl. EDA, multiplots, a wide selection of interactively rotatable 3D graphs; MacDraw-style tools) ■ Unlimited size of files ■ Full support for System 7, incl. "Publish and Subscribe" ■ Price \$595

Quick STATISTICA/Mac™ (for Macintosh) A subset of STATISTICA/Mac a comprehensive selection of basic statistics and the full graphics capabilities of STATISTICA/Mac ■ Price \$295.





The new LZR 965 from Dataproducts gives you everything you want from a laser printer at a price that may startle you. This true 600 x 600 dpi, Adobe® PostScript® Level 2 laser printer gives you greatly enhanced gray scale capabilities for optimum detail in graphics and photographic images. Even 4-point type is made clean and easy to read. And since the RISC-based processor can provide fast, flawless delivery of higher resolution images your output can look like a masterpiece every time. In no time.

	List Price	PPM	RISC Processor	Postscript Level 2	Resolution 600x600	Warranty
LZR 965	\$2,995	9	Yes	Yes	Yes	2 years
IBM 4029-10A	\$3,995	10	No	No	Yes	1 year
Apple LaserWriter IIg	\$4,999	8	No	Yes	No	1 year
QMS PS815MR	\$5,495	8	No	No	Yes	1 year

Combine Mac and PC system compatibility and superior paper handling with a very small footprint and you'll begin to experience the whole picture.

You don't need a trained eye to see that the extraordinary image quality and technologically advanced features will make this printer a classic for years to come. Add the fact that it's easy to use and inexpensive to own and you'll know why the LZR 965 has everybody talking. For finer details, contact the Dataproducts dealer nearest you or call 800-334-3174.

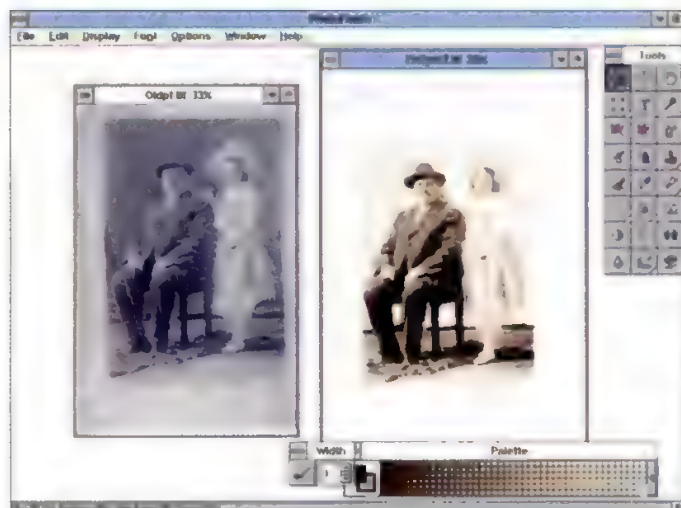
 Dataproducts.
The high performance printer people.™



Copyright 1992 Dataproducts Corporation. Dataproducts and its associated logomark are registered trademarks, and its tagline and LZR Series are trademarks, of Dataproducts Corporation. All rights reserved. Adobe and PostScript are registered trademarks of Adobe Systems, Inc. Grant Wood, American Gothic, 1930, oil on beechwood, 74.3 x 62.4 cm., Friends of American Art Collection. Copyright 1992 The Art Institute of Chicago. All rights reserved. All product names are trademarks or registered trademarks of their respective companies.

CIRCLE 298 ON READER SERVICE CARD

Image-Editing Software



PhotoFinish allows you to open multiple windows and compare the original image with the altered version. Creating the sepia tone in the image at right was as simple as selecting and applying a sepia palette.

RIGHT TOOLS FOR THE TASK

Both PhotoFinish and Paintbrush give you a healthy complement of tiles and palettes to choose from, as well as a handful of stock images to play and learn with. Aside from the toolbox, PhotoFinish includes stock filters and manipulable special-effects filters. Most dialog boxes include an invaluable screen preview to check work in progress.

One of PhotoFinish's most powerful features is actually a set of controls, called Softbrush Settings, that let you adjust the Edge, Density, Transparency, Fade Out, and Spacing for tools such as airbrush and clone. The Transparency and Edge settings, for example, helped us lightly clone trees from the background of one test image onto the roof of the red car in another image, allowing us to simulate a realistic reflection. PhotoFinish also remembers the individual settings for each tool.

Few of the image-editing packages reviewed in this story support multiple levels of undo, and, in the classic sense, Pho-

fortunately, you can't edit any of your selections, nor can you perform many operations (such as cloning), while a selection is active.

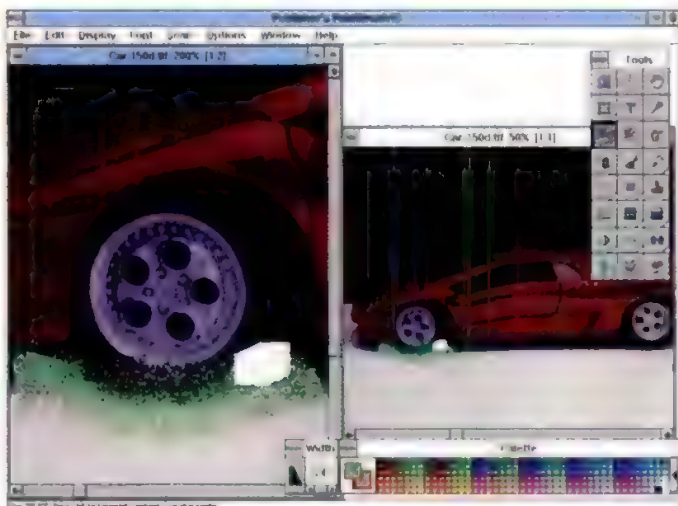
WHY PUBLISHER'S PAINTBRUSH?

So what does Publisher's Paintbrush bring to the table? In a word, depth. Along with a smattering of professional output features, Publisher has powerful tools such as Split into RGB color channels and Combine.

As the name implies, Combine lets you take two images and overlay them, one on top of the other. The combined image will look different, depending on

toFinish is no exception. Yet its local undo ranks as one of the program's most powerful tools. For example, following an extensive clone, we used local undo to draw back the original image over areas we hadn't intended to clone.

The selection tools in PhotoFinish are a mixed bag. They include the now nearly omnipresent magic wand and a simple marquee box. Un-



The color-replacer tool in Publisher's Paintbrush allows you to select a new color to replace an image's secondary color. Because the package offers no edge or transparency options, the newly added color does not blend into the image particularly well.

ViVa 14.4

\$449

- V.32bis Modem
- 14.4/FAX Group 3
- Hayes Compatible
- 57,600bps Data Throughput
- 8 Status Icons
- V.42bis & MNP5 Data Compression
- V.42/MNP 2-4 Error Correction
- EIA/TIA Class 1 & 2 FAX
- 65% Less Desk Space
- Asynchronous & Synchronous
- 5 YEAR WARRANTY

Call Now! **800-854-7600**

COMPUTER *INTERNATIONAL, INC.*

667 Rancho Conejo Blvd.
Newbury Park, CA 91320



ViVa, Hayes, and MNP are registered trademarks.

1-800-258-8088 • NOW—ORDER SATURDAY—RECEIVE ON MONDAY!



- ✓ Over 2000 Products
- ✓ Hassle-free Ordering
- ✓ Lowest Competitive Prices
- ✓ Skilled Sales Advisors

- ✓ Quality Products
- ✓ Latest Releases
- ✓ Open 24 Hours
- ✓ \$6 Overnight Shipping

NOW SPEAK YOUR

- Wir sprechen Deutsch
- Vi snakker Norsk, Svensk og Dansk
- Hablamos Español
- 日本語でどうぞ
- On parle Français
- 어제는 한국말을 사용합니까

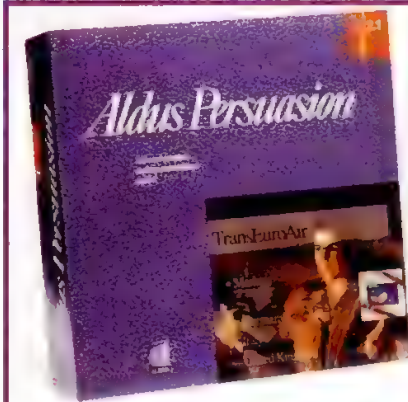
OUTSIDE USA & CANADA CALL 1-206-883-3088

Buy the Best—Our Top-Selling Software



Paradox 4.0
\$518

With its powerful Query-By-Example (QBE), you can ask complex, ad hoc questions about your data without the need for programming. Create multi-table forms and reports to solve your business data entry problems. Cross tabs help you pinpoint trends and relationships within the data. Borland #08019



Aldus Persuasion 2.1
\$328

- 36 AutoTemplate formats
- Word processor and outline processor
- Extensive drawing tools and special effects
- On-screen slide sorter for easy rehearsals
- Wipe and dissolve transition effects
- Speaker notes and audience handouts

Aldus Persuasion presentation software has everything you need to create persuasive presentations on short notice. With it you can easily create your presentation outline, overhead transparencies or 35mm slides, speaker notes and audience handouts. Simply select one of the auto-templates (or create one of your own), type your ideas into the outliner and you're off and running. Aldus Corp. #07736 - 5.25" disk • #07737 - 3.5" disk



Adobe Illustrator 4.0
\$394

w/Streamline
Adobe Illustrator 4.0 offers a complete professional illustration solution for the PC environment. The package includes Streamline, a powerful design utility which converts bitmapped images into high-quality PostScript artwork, in seconds. Also comes with ATM, 40 Adobe Type1 scalable fonts, TypeAlign, Adobe Separator and a generous selection of Adobe patterns, textures, symbols and borders. Adobe Systems • #07764 - 5.25" disk • #10791 - 3.5" disk

Adobe Illustrator Competitive Upgrade
#07785 for 5.25" disk • #10792 for 3.5" disk \$188

Ami Pro 3.0
Competitive Upgrade
\$94

How many word processors have you seen that do "almost everything?" Upgrade to the new version of Ami Pro and you get it all: a powerful grammar checker, click-and-drag outlining, revision marking, tables, a full macro language, power fields for document automation, a clean screen option to maximize your display area, complete WYSIWYG display, "hot links" to other Windows programs, and much more. Other word processors may still be working out the kinks, but Ami Pro 3.0 for Windows is soaring ahead. Upgrade price requires proof of ownership of a qualifying competitive product. Lotus #09723

Ami Pro 3.0 #09557 \$284



Ami Pro
WORD PROCESSOR

Alpha Four 2.0 Competitive Upgrade
\$94

Develop your own custom database solutions—without programming. Menu-driven Alpha Four makes complicated database operations simple. Plus it's fully relational and dBase compatible. Competitive upgrade price requires proof of ownership of a programmable database, flat file database, integrated software package, or spreadsheet with database module. Alpha Software #07476

Alpha Four 2.0 #07474 \$348



Image-In-Color

\$298
This is your guide to advanced color processing on the PC. This Windows-based 24-bit TRUE-COLOR image capture program comes with complete photo retouching functionality, for advanced DTP and press functions. It provides an electronic darkroom with gray-scale and color tools: Gamma, brightness, contrast, Magic Wand, with 12 filters and blending options. Supports TIFF, GIF, TGA, PCX and others. Supports over 50 scanners, True-Vision, Matrox, Raster Ops, Opta, Hercules, and other 24-bit Color Controllers. Image-In, Inc. #10995

Image-In-Color Pro #07781 \$478



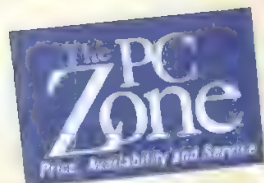
Microsoft Excel 4.0
Competitive Upgrade
\$118

The leading spreadsheet for Windows just got better. Microsoft Excel version 4.0 for Windows gives you access to more powerful features that make everyday spreadsheet tasks even easier. With Excel's new Help for Lotus 1-2-3 Users, you can type familiar 1-2-3 commands and get instructions or a demonstration of the equivalent Microsoft Excel commands. Requires proof of ownership of a qualifying competitive product. Microsoft Corp. #07892 - 5.25" disk • #07893 - 3.5" disk

Microsoft Excel Upgrade
#07755 for 5.25" disk • #07756 for 3.5" disk \$89⁹⁵
Microsoft Excel 4.0
#07757 for 5.25" disk • #07755 for 3.5" disk \$298

NOW SHIPPING
weekdays at 2 a.m. ET

Expanded Shipping Hours!
Order till 2 am E.T. Weekdays for Same Day Shipping



The Intelligent Way to Get from Here to There



AUTOMAP Road Atlas

\$58

AUTOMAP - The Intelligent Road Atlas is a unique software package that provides instant route planning and data profiles for over 51,000 cities in the U.S.A. and Canada. Search its massive database of over 359,000 miles of roads and highways for the fastest, most scenic or most convenient route to meet your needs. AUTOMAP #10778

AUTOMAP for DOS #09514.....\$58

AUTOMAP
INCORPORATED

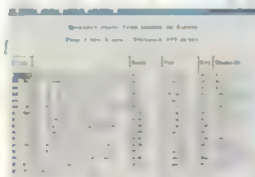


AUTOMAP EUROPE

\$84

Planning a vacation in Europe? Get the software that's better than a map. Just tell AUTOMAP EUROPE where you're going, when and where you'll be starting, what time you want to avoid, what you'd like to see on the way and what speeds you'd like to drive. This fast, fun and informative program takes over from there. AUTOMAP #10762

- Fun, fast and friendly
- Computerized trip planning
- Plan the right route for you
- Saves up to 20% of driving time and costs
- Clear, detailed up-to-date maps
- Customized print-out to take with you



BODYWORKS

\$46

Make anatomy an adventure with this colorful, comprehensive program that takes you on a journey through the entire body. BODYWORKS allows you to study all the structures, functions and systems of the body. It also includes detailed information on sports injuries, advice on illnesses, first aid and physical fitness information. Software Marketing #07324



CHEMISTRY WORKS

\$38

The chemical elements are the building blocks of everything around us. CHEMISTRY WORKS provides detailed information about each of the elements, from atomic weight and covalent radius to melting and boiling points. It presents three dimensional, color representations of atomic structures and elemental properties. It's more than the Computerized Periodic Table. CHEMISTRY WORKS is a comprehensive resource for students, teachers, chemical engineers, researchers and hobbyists. Software Marketing #10756

ORBITS

\$34

Bring the universe to your PC with ORBITS, a brilliantly interactive and comprehensive space simulator and atlas. Spectacular 3D graphics demonstrate the amazing operation of our solar system. Detailed animations of the movements of the inner and outer planet groups put the universe into perspective. With ORBITS, much more than the world is at your fingertips. Software Marketing #07448

- All major credit cards accepted
- Orders placed by 2am ET weekdays ship that day
- Orders placed Saturday ship to arrive Monday
- A 10% discount is applied to orders over \$100. Shipping to Canada is extra.
- Not responsible for typographical errors
- Defective software replaced immediately. Hardware repaired or replaced at our discretion.
- Return Authorization Number must be obtained prior to returning any item. Call Customer Service Hotline 1-800-248-9946 weekdays 9am to 6pm PT

International: 206-883-3088
FAX: 206-881-3421

WE HAVE HUNDREDS OF NEW RELEASES—CALL NOW • 1-800-258-8088

NOW SHIPPING
Weekdays till 2 am E.T.

Call Now for your FREE Catalog

We Carry Over 2000 Products at the Lowest Prices

Design It On Your Desktop

Design Your Own Railroad

\$38



Better than a model railroad in your basement! With Design Your Own Railroad you can design precision, to-scale (HO, N, O, Z, S, G) layouts using unique track laying tools. Then use the complete set of drawing tools to create scenery and depots. Finally, design and build your trains. Now you're ready to run a realistic railroad simulation. Abracadata #09944

Design Your Own Home...

Whether you are a professional or a do-it-yourselfer, Design Your Own Home can make your planning time more productive. Each program includes sample plans and a try-out section to get you started, plus command cards to keep by your side as you work. There are 3 programs: Architecture (floor plans to structural details), Interiors (furnishings to color schemes), and Landscapes (trees to fences). Includes several sample plans. Abracadata

Architecture • #09996		\$38
Interiors • #09998		\$54
Landscape • #09997		\$54

Sprout! **\$36**



Sprout! is a complete computer planning tool for vegetable gardeners. It lets you easily produce a graphic, scalable garden plan with correct plant and row spacing. In addition, Sprout! contains a fully editable database of vegetables for 7 climate regions. Print out garden layouts, calendars, shopping lists and reports. Abracadata #10794

DesignCAD 2-D

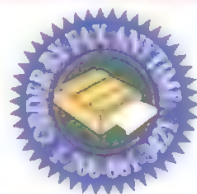
\$178

PC Magazine's Editor's Choice! DesignCAD has many built-in features that other CAD packages charge extra for.

- Extremely easy-to-use
 - Produces near-plotter output on most printers
 - Compatible with other CAD, publishing and graphics software
 - Includes and supports BasicCAD programming language
- Features of DesignCAD include pull-down menus, an on-screen manual, a tutorial and single keystroke commands. DesignCAD features a programming language, macros, and user-customized icon menus, extensive drawing and editing tools, dimensioning, area and center of gravity calculations and more. That's a lot of CAD power for an unbelievable price.

American Small Business Computer #09617 - 5.25" disk • #09613 - 3.5" disk

DesignCAD 3D 4.0 • #08007 for 5.25" disk • #09251 for 3.5" disk **\$254**



After Dark

\$28

After Dark 2.0

It's zany. It's fun. It's functional. It's After Dark for Windows 2.0. Now you can prevent screen burn-in with over 40 incredible displays: Flying Toasters, Fish, Swans, MultiModule, Logo, Messages and many more. Enjoy digital sound. True Color VGA and Super VGA graphics. WallZapper (turns an After Dark display into wallpaper), Network Password Support and password protection for Windows and DOS. Also includes DOS blanking to black and System IQ activity monitor. Berkeley Systems #07787



**UP TO \$10
SAVE**

PowerEdit 1.1

\$138

No matter how good a writer you are, you need a good editor. PowerEdit is a

great one, receiving PC Magazine's "Editor's Choice" award for writing tools. It helps you with more than just grammar, checking clarity of statements, style and tone as well. You can choose from four analysis types; Business, Literary, Journalistic or Technical. No matter what your writing style, PowerEdit can help you express your ideas. PowerEdit works simultaneously with your word processing program. Artificial Linguistics/Oracle #07713 - 5.25" disk • #07714 - 3.5" disk



HiJaak

\$128

HiJaak for Windows converts, views, captures, enhances and prints graphics images. It converts 23 raster formats, 15 vector formats and 24 popular fax card formats. It captures graphics screens from Windows and graphics text screens from DOS applications. Inset #07857

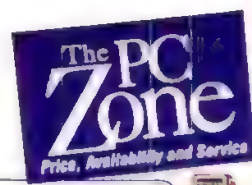


CODE #20904

1-800-258-8088 • OVERNIGHT SHIPPING ONLY \$6 • OPEN 24 HOURS

NOW SHIPPING
Weekdays 9 AM - 5 PM E.T.

If You're Not Shopping the PC Zone You're Paying Too Much!



MXT 7080A 80 Meg Hard Drive \$298



Unsurpassed performance and design characterize Maxtor's family of 1-inch high, 3.5-inch hard disk drives. Available with an IDE controller, this 80MB model is ideal for use in mobile or desktop computer systems. Firmware control allows reduction of power consumption to just 0.1 watt. Other features include 150,000 hour MTBF, 64K cache, 1:1 interleave, automatic actuator lock, embedded servo, and high performance rotary voice coil. Maxtor #10661

MXT 7120A 130 MB • #10665 \$378
MXT 7123A 213 MB • #10662 \$528
MXT 340A 340 MB • #10663 \$998



Where Power Is Shared: The LAN ZONE



One of the newest developments in information systems for power-using businesses is the installation of a Local Area Network, or LAN. Functioning much like a server, a LAN lets connected PCs access shared information. But a LAN has many advantages. It allows PCs to function as peers, able to use each others full functions from any unit on the connected system. Any PC accessing the LAN also has full use of all

connected peripherals, as if it were connected to them directly. A Local Area Network can also be accessed from a remote PC not on the network; even one connected to another LAN in another city (via modem). The configurations of a LAN are almost limitless. And the benefits of sharing information in a peer-to-peer fashion will have you wondering how you ever did business without one.



Network 3.11

Call for
Competitive
Pricing

PC Zone Novell Authorized

Now the PC Zone is your authorized dealer for Novell products. Novell is the industry leader in complete connectivity solutions. And now you can get the power of Novell products at prices you won't find anywhere else. Whether you are just starting a network or expanding an existing one, the PC Zone is your source for networking products from Novell.

Ethernet 16bit Starter Kit

\$418



This is one of the fastest peer-to-peer networks on the market. This 16-bit Invisible Network Starter Kit includes 2 adapter cards, 25 feet of coaxial RG58 A/U cable, 2 terminators, 2 T connectors, software & hardware user's manual. This means you get an instant network on receipt. The package even includes our award-winning Windows 3.0/3.1 graphical network interface, allowing unmatched functionality within Windows 386 Enhanced or Standard mode of operation. Invisible Network #11048

Parallel Port Adapter Coax #11050 \$308

Shared Access Modem Sharing Kit

\$698



This kit gives LAN administrators reliable, easy-to-use communications resource sharing for any size LAN in a single, complete and integrated package. All cabling is included, as well as On-LAN communications software. Best of all, it requires virtually no on-going support by the LAN administrator.

- High-speed V.32bis modem (effective data throughput up to 57.6Kbps).
- Perfect for small- to medium-sized companies with moderate communications traffic.
- Incredibly easy to use, no more difficult than E-Mail.

U.S. Robotics #11203



Desktop TV

\$244

Is it a TV or a computer monitor? How about both. The unique Desktop TV video card lets you receive up to 119 cable frequencies, as well as crisper display for PC 100% compatibles—all on your monitor. You get a sharper image than with standard television sets, with the ability to switch from TV to PC in a single touch. This patented add-on board installs easily and is compatible with Windows, LAN networks, VHF, UHF, VCR, video camera or videodisc. Visionex #11205

Multimedia: For the Eyes, Ears and Mind



Multimedia Upgrade Kit Plus

\$864



This high-powered multimedia kit will set you up for Multimedia PC and Windows 3.1. You not only get the most reliable hardware, like the Pro AudioSpectrum Plus sound card and the Sony CDU-535 CD-ROM drive. You also get Windows 3.1, Compton's Multimedia Encyclopedia on CD-ROM, King's Quest V on CD-ROM, MacroMind Action! on CD-ROM, Stereo Studio F/X (sound editor), TrakBlaster Pro (music) and much more. Media Visions #10567

Pro 16 Multimedia Upgrade Kit #10692 \$998
Pro Audio 16 #10568 \$228
Portable Audio Port #10570 \$148

CDR-37 w/CD Gallery

\$548



NEC's CDR-37 offers low cost entry to Multimedia CD-ROM. Its features include a 450ms average access time, MPC compliance and more. The included NEC CD Gallery gives you everything you need—hardware, cables and speakers. And it comes with seven CDs: World Atlas, The Time Table of History, Battle Chess, The New Grolier Electronic Encyclopedia, The TIME Almanac Great Cities of the World and National Geographic's "Mammals." NEC #11121

CDR-74 Gallery External (280ns) #11122 \$778
CDR-84 Internal #11120 \$589

Sound Blaster Pro Basic

\$158

NEW



This cost-effective multimedia solution comes with all the features of top-of-the-line Sound Blaster Pro, stereo audio (without MIDI cabling and sequencer software), and a rich assortment of software that will make people sit up and listen. This is the perfect companion for all leading sound-enhanced applications, presentation packages and MPC authoring tools. The Sound Blaster Pro Basic is easily upgradeable to Sound Blaster Pro. Creative Labs #11204

Multimedia Upgrade Kit
Internal #07698 \$564
Video Blaster #10728 \$344

CIRCLE 199 ON READER SERVICE CARD

SHOP THE ZONE ON COMPU-SERVE 'GO INZ' OR CALL 1-800-258-8088

NOW SHIPPING
Weekdays 10-2 am E.T.

■ A Filter Sampler

Here are some examples of the types of filters you can use to add special effects to your images and some parameters you can specify for them. Unfortunately, filter-naming conventions are not standard across programs.



Original image



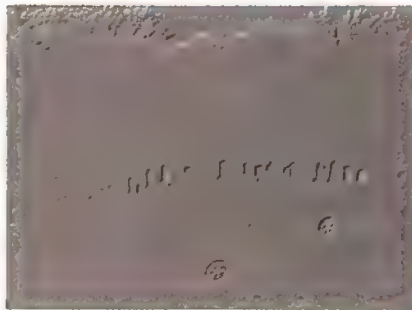
Motion blur
(Length = 10 pixels, angle = 5°)



Posterize
(6 levels per channel)



Mosaic
(10 by 10 pixels)



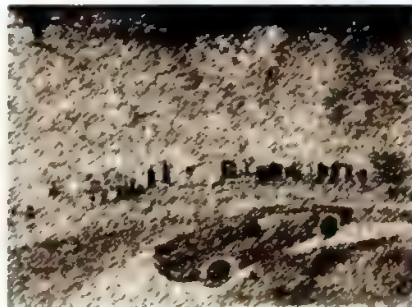
Emboss
(Depth = 2 pixels, coating = midtone)



Stucco
(Light source = upper center, crack spacing = 25,
depth = 10, brightness = 2)



Sphere
(no options)



Graphic pen
(Stroke length = 15, direction = right diagonal,
light/dark balance = 50)



Whirlpool
(Angle = 60°)

Country Day School Expels NetWare



At the Country Day School in Arlington, Texas, students get individualized computer learning at an early age. Eighteen 386 PCs are networked to share encyclopedias on CD-ROM, a raft of reading, writing, math and science software in the classroom and Windows applications in the office.

The chairman says that if NetWare were a student, it would flunk reliability. "All we could predict is that we'd have problems. We bought the latest and greatest. NetWare 3.11 was difficult to use and required constant maintenance."

So they graduated to a LANTastic network with the help of Guy Dragoo at The Productive Edge, an Artisoft Authorized Five Star™ dealer. "LANTastic does the job better than Novell, shares the CD-ROM with every station and can expand to 300 stations, all for 50% less," Mr. Fanning says. He gives the LANTastic network an A+.

The Country Day School board of trustees plans to add grades seven through twelve. "We're on a growth curve right now. The network has performed above and beyond our expectations. No matter how many nodes we add, our LANTastic network grows right with us," Chairman Fanning says. "We believe it's the best network out there."

"LANTastic does the job better than Novell... for 50% less."

—James Fanning,
Chairman of the Board



THE BIG SWITCH
INTERVIEW #11

Visit your
Artisoft Authorized Five Star dealer

**AUTHORIZED
DEALER**



Learn how an easy-to-use, yet powerful LANTastic system can share files, printers, CD-ROMs and other peripherals and still avoid cost and confusion. Two-station LANTastic Starter Kits from \$499 contain all you need to begin. If you have a NetWare system installed, you can take a vacation from its headaches by converting to a LANTastic system—a \$2495 value for \$499, saving nearly \$2000. To find out how, call us at 1-800-TINY RAM ext. 600, and we'll give you the name of your nearest Artisoft Authorized Five Star™ dealer.

WHY BUY FROM ARTISOFT?

- ◆ FREE unlimited technical support to registered end users and dealers
- ◆ 30-day money-back guarantee on all Artisoft products
- ◆ 5-year limited warranty on all Artisoft hardware

LANTIMES
READERS
CHOICE
1992

PC
MAGAZINE
EDITORS'
CHOICE
April 14, 1992
LANTastic Version 4.10

MAGAZINE
1992
PRODUCTS
OF THE YEAR

ARTISOFT

Revolutionizing Connectivity

691 East River Road, Tucson, AZ 85704
Sales/Customer Service 1-800-TINY RAM, ext 600

© 1992 ARTISOFT, INC. All rights reserved. LANTastic is a registered trademark, Artisoft Authorized Five Star is a service mark and Artisoft is a trademark of Artisoft, Inc. NetWare is a trademark of Novell, Inc. LAN Times Readers Choice Award is a registered trademark of McGraw-Hill Corp. PC Magazine Editors' Choice Award is a registered trademark of Ziff Communications Co.

CIRCLE 254 ON READER SERVICE CARD

► **S U M M A R Y O F F E A T U R E S**

Image-Editing Software

Products listed in order as reviewed



■ = YES □ = NO

	Aldus PhotoStyler	Image-In-Color	Image-In-Color Professional	ImagePals	PhotoFinish	Publisher's Paintbrush
List price	\$795	\$495	\$795	\$249	\$199	\$495
Operating environment	Windows	Windows	Windows	Windows	Windows	Windows

General Features

Total memory required	2MB	2MB	2MB	2MB	2MB	2MB
Supports expanded/extended memory	■ ■	□ ■	□ ■	■ ■	■ ■	■ ■
Disk space needed for program files	4MB	1 6MB-3MB	1 6MB-3MB	2.8MB-3 5MB	1MB-3MB	2MB-7MB
Color depths supported:						
MCGA	□	□	□	■	■	■
VGA	■	■	■	■	■	■
16-color SVGA	■	■	■	■	■	■
256-color SVGA	■	■	■	■	■	■
32,000-color SVGA	■	■	■	■	■	■
16.8 million-color SVGA	■	■	■	■	■	■
Ruler	■	■	■	■	□	□
Zoom	32 increments	8 increments	8 increments	16 increments	8 increments	14 increments
Revert to last-saved version	■	■	■	■	□	□
Undo/Redo	■ ■	■ ■	■ ■	■ ■	■ □	■ □
OLE support (Windows applications)	□	□	□	□	□	□
Named clipboards	□	■	■	□	□	□
File interchange (reads/writes):						
.BMP	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
.CLIP (Windows Clipboard)	□ □	■ ■	■ ■	□ □	■ ■	■ ■
EPS	■ ■ (reads only PhotoStyler or ImagePals files)	□ ■	□ ■	■ ■ (reads only PhotoStyler or ImagePals files)	□ ■	□ ■
With TIFF preview	■ ■	■ ■	■ ■	■ ■	□ □	□ □
Without TIFF preview	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
.GIF (CompuServe)	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
.IMG (GEM)	□ □	■ ■	■ ■	□ □	□ □	□ □
.JPEG	■ ■	□ □	□ □	■ ■	□ □	□ □
.MSP	□ □	■ □	■ □	□ □	■ □	■ □
.PCX	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Compressed	□ □	■ ■	■ ■	□ □	■ ■	■ ■
.TGA	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
32-bit	■ □	■ ■	■ ■	■ ■	■ □	■ □
TIFF	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Compressed	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Macintosh TIFF	■ ■	■ ■	■ ■	■ ■	□ □	■ □
DCS (write only)	□	□	□	□	□	□
Kodak PhotoCD (read only)	□	□	□	□	□	□
Thumbnail browser	□	□	□	■	■	■

Painting Tools

Airbrush	■	■	■	■	■	□
User can specify shape	■	■	■	■	■	N/A

N/A—Not applicable: The product does not have this feature

GRAPHICS

Image-Editing Software



Picture Publisher	PixoFoto
\$495	\$895
Windows	DOS

	4MB	640K
	■■	■■
4.5MB-10.7MB		2MB
	□	□
	■	□
	■	□
	■	■
	■	■
	■	■
	Continuous	8 increments
	■	■
	■■	■■
	■	N/A
	■	□
	■■	□□
	□□	□□
	□■	□■
	■■	■■
	■■	■■
	■■	■■
	□□	□□
	■■	□□
	□□	□□
	■■	■■
	□□	■■
		(Targa-compressed only)
	■■	■■
	■□	■■
	■■	■■
	■■	■■
		(Targa-compressed only)
	■■	□□
	■	□
	■	□
	■	□
	■	■
	■	■

CONTINUES

FACT FILE

PhotoFinish, Version 1.01

Publisher's Paintbrush, Version 2.02

ZSoft Corp., 450 Franklin Rd., #100,
Marietta, GA 30067; 404-428-0008;
fax, 404-427-1150

List Price: PhotoFinish, \$199; Publisher's Paintbrush, \$495.

Requires: 2MB RAM, Microsoft Windows 3.x. 386-based PC or better, 4MB RAM recommended.

In Short: PhotoFinish is an inexpensive and generally easy-to-use package with some powerful features and controls typically found in professional packages. An inability to handle large images may restrict its usefulness for some users. Publisher's Paintbrush has the expected depth of a more mature image-editing package, but with a clunkier interface and some less sophisticated features than PhotoFinish.



how you tell the package to add, subtract, or figure the differences between the images. You can also create or edit custom filters using the product's Custom Convolution Filter.

Problems with memory management seemed to plague both packages. They create virtual memory blocks on your hard disk, theoretically giving you the ability to use any and all system resources for editing even the largest 24-bit color image. Yet in our testing, neither could reasonably edit a 24-bit, 300-dpi, 8-by 10-inch image without crashing the machine or, at the very least, significantly decreasing performance. We found ourselves waiting endlessly for PhotoFinish to replace the background color on a 24-bit color test image of a car. To measure performance in a reasonable amount of time, we had to run our tests on both of the packages using the same images resampled at 150 dpi.

PhotoFinish offers only minimal gamma-correction facilities for the display. In contrast, Paintbrush has a closed calibration scheme that begins by scanning in a calibration picture, and ends by using the printed output and the on-screen scan to calibrate the scanner, screen, and printer. All calibration maps can be saved and loaded on startup. If you

don't own a scanner, Publisher has some built-in device-specific compensation maps that you can load.

Both products offer internal image scan features. However, in our test-bed, neither product could adequately work with the Hewlett-Packard ScanJet IIc. The beta driver we tried helped the packages recognize the scanner, but the outcome was erratic, with images scanned in doubled or completely blurred.

Similarly, neither package's manual is especially strong, although PhotoFinish's better illustrates how each tool effects the image. Unfortunately, PhotoFinish occasionally forgets its audience and throws out terms like "Color Tolerance" without adequately explaining them.

All of this presents a very good argument for taking the best of both Publisher's Paintbrush and PhotoFinish, and merging them into one product that combines usability and functionality. Until that time, PhotoFinish remains a worthy, low-cost image-editing tool with few significant shortcomings.

Micrografx Inc.

Picture Publisher, Version 3.1

BY GAYLE C. EHREMAN
AND JEFF MACE

Picture Publisher (\$495) is something of an anomaly among image-editing packages: It is full-featured enough for professionals, but it's uncomplicated enough for rank amateurs. This package includes just about every image-enhancement tool you can think of, and with a few exceptions, they are all as easy to use as crayons and a coloring book.

Ease of use starts with Picture Pub-



SUITABILITY TO TASK

Picture Publisher

	POOR	FAIR	GOOD	EXCELLENT
Photo retouching	●	●	●	●
Creative editing	●	●	●	●
Hard-copy output	●	●	●	●
Electronic output	●	●	●	●

► SUMMARY OF FEATURES

Products listed in order as reviewed

■ = YES □ = NO



	Aldus PhotoStyler	Image-In-Color	Image-In-Color Professional	ImagePals	PhotoFinish	Publisher's Paintbrush
Painting Tools (continued)						
User can specify thickness	■	■	■	■	■	N/A
User can specify transparency	■	□	■	□	■	N/A
Arcs	□	■	■	□	□	□
Brush	■	■	■	■	■	■
Edit brush shape/Save brush	■ ■	■ ■	■ ■	□ □	■ □	■ □
Specify transparency	■	□	■	□	■	□
Circles and ellipses	□	■	■	□	■	■
Curves (Bezier/freehand)	□ □	■ ■	■ ■	□ □	■ ■	■ ■
Fills	■	■	■	■	■	■
Linear and radial gradient fills	■	■	■	□	■	■
Choose angle (linear fills)	■	■	■	N/A	■	■
Choose angle (radial fills)	■	■	■	N/A	□	□
Lines:						
Specify transparency	■	■	■	□	□	□
Polylines/Polygons	□ □	■ ■	■ ■	□ □	■ ■	■ ■
Rectangles	□	■	■	□	■	■
Smudge	■	■	■	□	■	■
Specify shape/thickness	■ ■	■ ■	■ ■	N/A	■ ■	□ ■
Specify transparency	□	□	□	N/A	□	□
Text Handling						
Font type	Any Windows font	Any Windows font	Any Windows font	Any Windows font	Any Windows font	Proprietary bitmap and scalable fonts
Align	□	■	■	□	■	■
Size/Style	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Image Processing						
Brightness/Contrast	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Equalize	■	■	■	■	■	■
Color and gray-scale correction:						
Select highlight, midtone, and shadow	■	■	■	■	■	■
Directly manipulate colormap	■	■	■	□	■	■
Histogram	■	■	■	■	■	■
Hue/Saturation	■ ■	■ ■	■ ■	■ ■	■ ■	□ □
Negative/Posterize	■ ■	■ ■	■ ■	■ ■	■ □	■ ■
Skew/Perspective	■ ■	□ □	■ ■	■ □	□ □	■ □
Stitching	□	□	□	■	■	□
Image-Editing Tools						
Paste to New	■	□	■	□	■	■
Paste into selection/Paste outside selection	■ ■	■ ■	■ ■	■ ■	□ □	□ □
Paste to brush (stamp)	■	■	■	□	■	■
Clone	■	■	■	□	■	■
Transparency/Feather	■ ■	■ ■	■ ■	N/A	■ ■	□ □
Filters:						
Add noise	■	■	■	□	■	□
Averaging	■	□	■	■	■	■
Blur	■	■	■	■	■	■
Despeckle	■	■	■	□	■	■
Detect/enhance edges	■	■	■	■	■	■
Emboss	■	□	■	■	■	■

N/A—Not applicable. The product does not have this feature

Picture
Publisher

PixoFoto

lisher's tidy, icon-driven interface. All the most frequently used retouching, masking, and drawing tools are arranged in a movable icon toolbox. In most cases, clicking on an icon opens its complete toolset—a pull-out icon bar of all the associated tools. When you click on the Draw tool, for example, you are presented with icons for four different kinds of drawing tools (pencil, rectangle, ellipse, and freehand lines). Once you've chosen your tool, Picture Publisher displays its options in a ribbon across the top of the window. There is also a hint line across the bottom of the screen that changes to reflect the tool on which your cursor is positioned, and, if you're confused, context-sensitive, on-line help.

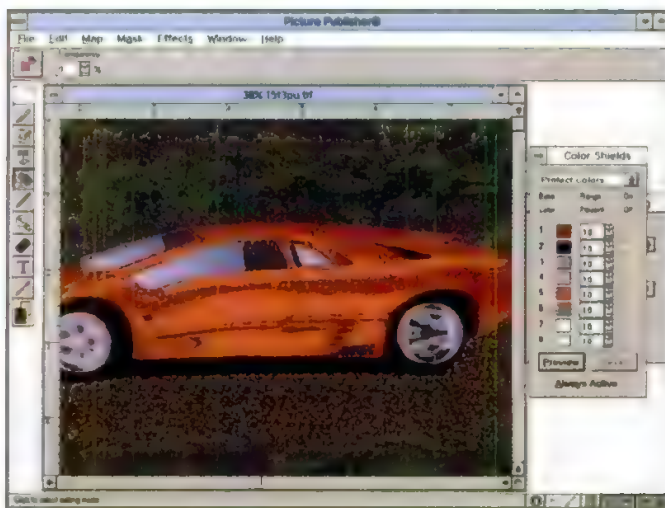
To help you find an image quickly, Micrografx added an image browser that lets you view thumbnails of your images, with their names displayed underneath. You can open, as well as copy, delete, and rename image files from the browser.

While useful, accidentally turning on “view thumbnails” can waste time if you have no pre-generated thumbnails for a directory; it would be desirable to cancel out of thumbnail generation.

Ease of use is not Picture Publisher's only draw. When it comes to tools, Micrografx gives you all those you would expect to find, as well as some no other product offers. Perhaps the most

innovative tool in the box is the Automask option of the Smart Mask tool. To mask the woman in our old-style photo, we simply clicked at the starting point for the mask, moved the cursor a short distance along an edge, then clicked again. Automask automatically and accurately traced the outline of the image, following the path we specified.

Besides masking an image by shape, you can also mask by color, using the Color Shield tool to select or protect up to eight color ranges. And when you're finished drawing your mask, you can ad-



To change the colors of just the background elements in this image, we used Picture Publisher's color-shield tool to protect the colors of the car, then applied a gray fill to the entire image. The color shield allows you to pick up to eight colors from your image and choose color similarity ranges around each for the program to protect against changes.

IBM LaserPrinters: The Windows. And

Most laser printers slow to a walk under Windows.



Announcing a Windows™ driver designed to leave other printers in the dust: the new IBM® 4029 Print Accelerator for Windows.

It's now standard equipment on IBM LaserPrinter Models 5E, 6, 6P, 10, 10P, and 10L, at no extra cost. And it delivers supercharged printing speeds with Windows—for more of the productivity and convenience that Windows is all about.



If you already own a LaserPrinter 5E, 6, 6P, 10, 10P, or 10L, call 1 800 358-5835 for your free driver upgrade.*

Now complex graphics and multiple fonts print with surprising speed. You can use both Type 1 and TrueType™ fonts. And you get the crisp, 300 dpi output and superb

Application	HP® LaserJet® III with standard Windows driver	IBM LaserPrinter 10 with Print Accelerator for Windows	Speed Increase
Harvard Graphics®	1566 seconds	633 seconds	147%
Aldus® PageMaker®	85 seconds	52 seconds	62%
CorelDRAW™	126 seconds	96 seconds	31%

Independent NSTL testing, using complex text-and-graphics documents.

*Free upgrade available through 10/18/92. Print Accelerator requires a PC with 386 SX processor or higher and 4MB of RAM. IBM is a registered trademark of International Business Machines Corporation in the U.S. and/or other countries and is used under license. HP and LaserJet are registered trademarks of Hewlett-Packard Company. Harvard Graphics is a registered trademark of

IBM LASERPRINT

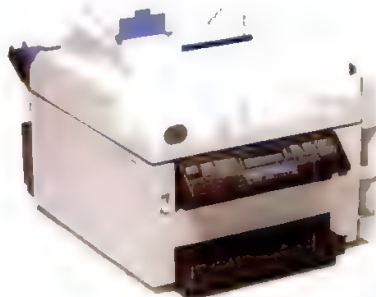
difference between power Windows.



With the new Print Accelerator for Windows, IBM LaserPrinters keep you comfortably ahead.

paper handling IBM LaserPrinters are famous for.

IBM LaserPrinters come to you from Lexmark International, an independent worldwide company, formerly a division of IBM, that develops, manufactures, and markets IBM personal printers, IBM typewriters, related supplies, and keyboards.



*Up to 150% faster Windows printing,
on the LaserPrinter 5E, 6, 6P, 10, 10P, and 10L.*

CIRCLE 098 ON READER SERVICE CARD

For your nearest dealer, call 1 800 358-5835
(in Canada, 1 800 663-7662).

And see something truly unique: a laser printer that can fly through Windows. And look great doing it.

IBM Personal Printers by

LEXMARK™

Make Your Mark

Software Publishing Corporation. Aldus and PageMaker are registered trademarks of Aldus Corporation. Lexmark is a trademark of Lexmark International, Inc. TrueType is a trademark of Apple Computer, Inc. registered in the U.S. and other countries. Windows is a trademark of Microsoft Corporation. CorelDRAW is a trademark of Corel Systems. © 1992 Lexmark International, Inc.

ERS. PAGES AHEAD.

GRAPHICS
Image-Editing Software

► SUMMARY OF FEATURES

Products listed in order as reviewed

■ = YES □ = NO



	Aldus PhotoStyler	Image-In-Color	Image-In-Color Professional	ImagePals	PhotoFinish	Publisher's Paintbrush
Image-Editing Tools (continued)						
Mosaic	■	■	■	■	■	■
Motion blur	■	□	■	□	■	■
Sharpen	■	■	■	■	■	■
Smooth	■	■	■	□	■	■
User-definable filters	■	□	■	□	□	■
Image combination:						
Add/Subtract	■ ■	■ ■	■ ■	□ □	□ ■	■ ■
Composite (combine with mask)	■	■	■	□	□	□
Anti-alias	■	□	□	□	□	□
Specify opacity	■	■	■	□	□	□
Lighten or darken area	■	■	■	□	■	■
Selection:						
By color (magic wand)	■	■	■	■	■	□
Circle/Ellipse	■ ■	■ ■	■ ■	■ ■	□ □	□ □
Free-form	■	■	■	■	■	■
Polygon/Rectangle	■ ■	■ ■	■ ■	□ ■	■ ■	■ ■
Select all/Invert selection	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Edit nodes	□	□	□	□	□	□
Move mask/Resize mask	■ ■	■ ■	■ ■	■ □	□ □	□ □
Expand selection by color similarity/by selection	■ ■	□ □	■ ■	□ □	□ □	□ □
Save selection	■	□	■	□	□	□
Split into or combine by color channels	■	□	■	□	□	■
Splittable models	CMYK, HLS, HSB, RGB	N/A	CMYK, HSV, RGB	N/A	N/A	RGB
Tile patterns	■	■ (black-and-white)	■ (black-and-white)	□	■	■
Palette handling:						
Color models supported:						
RGB	■	■	■	■	■	■
CMYK	■	■	■	□	■	□
HSB (HSV)/HLS	■ ■	■ □	■ □	■ □	□ ■	□ ■
Pantone	□	□	□	□	□	□
User-definable palettes	■	■	■	□	■	■
Input Device Support						
Digitizers	Any Windows device	None	None	Any Windows device	Any Windows device	Any Windows device
Supports pressure sensitivity	□	N/A	N/A	□	□	■
Slide scanners	Microtek, Nikon	None	Microtek	Microtek, Nikon	Microtek	Microtek
Frame-grabber boards	Any Windows- compatible board	None	None	Any Windows—or PC Video- compatible board	DAK	DAK
Hand scanners	Any Windows- compatible product	Complete PC, NISCA	Complete PC, NISCA	Genius, Mustek	Complete PC, DFI, Genius, Logitech, Mouse Systems, Mustek, Niscan	Complete PC, DFI, Genius, Logitech, Mouse Systems, Mustek, Niscan
Page scanners:						
AVR	□	■	■	□	□	□
Canon	□	■	■	■	■	■
Epson	■	■	■	■	■	■

N/A—Not applicable. The product does not have this feature.



	Picture Publisher	PixoFoto
		
		
		
		
		
	 	 
		
		
		
		
		
	 	 
		
	 	 
	 	 
		
	 	 
	 	 
		
		
	CMYK, RGB	CMYK, HSL, HSB, RGB
		
		
		
	 	 
		
		
	Any Windows device	Calcomp, Wacom
		
	None	None
	Willow	None
	Mustek	None
		
		
		

CONTINUES

PC **FACT FILE**
MAGAZINE
EDITORS' CHOICE
Picture Public

**Picture Publisher,
Version 3.1**

**Micrografx Inc., 1303 Arapaho, Richardson,
TX 75081; 800-733-3729, 214-234-1769;
fax, 214-994-6334**

List Price: \$495.

Requires: 386-based PC or better, 4MB RAM, 40MB hard disk, DOS 3.1 or later, Microsoft Windows 3.x. Super VGA or 16- or 24-bit video card recommended.

In Short: Picture Publisher has not only gotten older, it has gotten better. This version adds advanced editing capabilities, an image browser, and OLE support to a feature set that was already one of the fullest in this category. For ease of use and flexibility, this one is hard to beat.



ON READER SERVICE CARD

just its shape by using the mask point-editing tool to delete, add, or move points, or choose the Mask Transform tool to move or change the size and aspect ratio of a mask, as well as to rotate and skew it. In addition, you can save your finished mask to a named file.

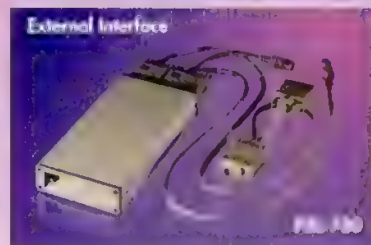
JUST THE RIGHT TOUCH

Picture Publisher doesn't skimp on the photo-retouching tools, either. All the tools you would expect from a high-end package are here, including paint, air-brush, texture (which lets you paint with a texture), and smear. All the tools allow you to specify brush size and type, as well as degree of transparency and feathering. The most unusual tool in this collection is a clone tool that can not only clone one part of an image onto another, but can clone across images. This ability was particularly useful for duplicating the background segment in our car test image. We opened a background image in one window; cloned parts of it into a new image; painted a road with the texture tool; and pasted in a car, saved as a mask from a third image.

Color handling is just as robust. There is the requisite color-probe tool and a color picker that allows you to choose colors by defining HSL, RGB, or CMYK values or simply by clicking on the desired shade in the color model display. Though you can specify a CMYK value for a color, you can't work in CMYK

Add A Pen To Your Desktop PC

ake today's desktop PC, add an updated piece of proven technology, and you're ready for tomorrow's pen computing applications. Today you can draw, point, click, drag and position. Tomorrow you'll use ink for freehand document annotation, gesture editing and handwriting recognition. A light pen does it all with the CRT you've already got on your desk.



With FTG's new external interface, installation and use of a light pen has never been easier. Supporting both Microsoft Windows® for Pen and PenRight!, FTG's Pen Computing packages start at \$398. Call for more information or FTG's 30-day no-risk trial offer.

FTG DATA SYSTEMS

8381 Katella Avenue, Stanton, CA 90680
(714) 995-3900 (800) 962-3900

Introducing Motorola's New PC Server.

Motorola takes the notion of downsizing one small step further with our compact new 8120 server. It's a powerful, RISC-based PC server with a footprint so small it can fit on your desktop. What's more, it integrates seamlessly into your existing NetWare and LAN Manager LANs. And it offers up to 64MB of RAM, 38 MIPS of performance, and 5GB of storage to PC workgroups in DOS, OS/2, even Macintosh environments.

The Price Is Right, Starting Below \$5,000*.

Only Motorola has the know-how to make a server so small and powerful, so affordable. Using fewer parts and more efficient manufacturing processes, Motorola saves money every step of the way. A savings passed right on to you.

More Users, Less Real Estate.

Your PC workgroup may grow in complexity, but your server won't. Thanks to a modular, user-installable design, adding users and capacity is as easy as stacking boxes.

Big On Reliability.

Naturally, fewer parts means fewer problems. But when necessary, field service is simply a matter of swapping modules. Now that's the kind of quality and support you expect from Motorola. And the new 8120 is just part of our extensive family of high performance, RISC-based network servers.

To put one on your network right now, call Motorola today. We'll show your PC workgroups how smaller is better.

1-800-759-1107 Ext. PCM

Now Motorola Puts The Client Server Thing In Proper Perspective.



©1992 Motorola Inc. Motorola and the Motorola logo are registered trademarks of Motorola Inc. All other brand or product names mentioned are trademarks or registered trademarks of their respective holders. *Excluding disk and tape options.



MOTOROLA

Computer Group

Because The Game Has Changed

mode; you can work only in RGB. The package ships with a selection of pre-defined palettes and allows you to edit, combine, and save named palettes. A useful new feature allows you to create a 256-color palette from your active image by simply pointing and clicking.

For those well-versed in image editing, Micrografx has also added a series of advanced editing options that can be used in conjunction with the painting and retouching tools to achieve interesting color effects. These options let you combine or mix colors using additive or subtractive color spaces, as well as change an image according to hue, saturation, or lightness, and change the red, green, or blue channel of an image.

SPEEDY PERFORMER

Picture Publisher is no slouch when it comes to speed. It proved significantly faster than its closest competitors on PC Magazine Labs' tests, particularly on the

Though this version improves on memory management, Picture Publisher can still bog down when working with very large images.

Arbitrary Angle Rotate test.

There are some areas that could still benefit from improvement. For instance, though Version 3.1 adds a JPEG compression option, at the time of this review, it was unable to compress our 21MB test image. This problem, however, should be corrected by the time you read this. Other problems include the inability to escape out of many operations and to autoscroll across a large image. And though this version improves on memory management, the package can still become a bit bogged down when working with large images.

These are minor flaws in what has become a powerful, easy-to-use package. The enhancements in this new version of Picture Publisher, combined with the new low price, make it a tough package to beat.

PixoArts Corp.

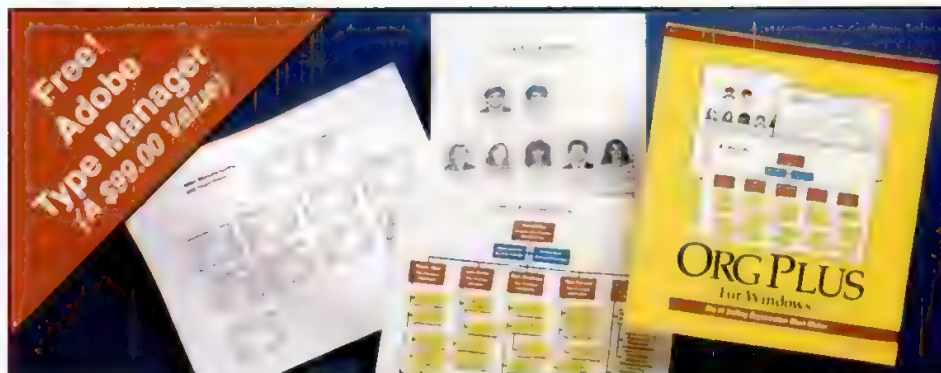
PixoFoto, Version 1.0

BY JENNIFER ZAINO

PixoArts Corp.'s PixoFoto, Version 1.0, brings some powerful features to the budding PC image-editing market, but it does so at the expense of speed and accessibil-

ity. And at \$895, it's the most expensive package in the category, with little to justify the expense.

A DOS-based program, PixoFoto's interface may prove a bit disconcerting to anyone accustomed to working in Microsoft Windows. Rather than being neatly cordoned off in a menu bar at the top of the display, PixoFoto's root menu and toolbox float. This is certainly a flexi-



The Quick, Professional Way to Show Who's Boss

Banner Blue brings you a new Windows™ version of its #1 selling org chart maker — *Org Plus® For Windows!* Get fast, professional-looking organization charts from the most widely used org chart maker in the world.

Fast and Fully Automatic

Org Plus For Windows automatically draws boxes and lays out the connecting lines, creating professional-looking organization charts. Type text directly into each box. Move a department or give it a different chart style — Org Plus reformats your entire chart instantly!

Our Most Powerful Org Chart Maker

Show all real world business relationships such as co-managers, subgroups, dotted-line connections, different types of staff positions, and multiple topmost boxes.

What You See is What You Get

You always see on the screen what your chart looks like when printed. Need to delete a box? Select it and press the Delete key — the box disappears from the screen! Need to change a font? Select the text and choose a font from a pull-down menu — Org Plus redisplayes your text instantly!

Built for Windows from the Ground Up

Click icons to create boxes and change chart styles. Make selections from pull-down menus and dialog boxes. Display and print your chart in vibrant colors. You can even scan pictures of your employees into the boxes of your chart!

Compact Charts

Use the powerful Make Fit command to apply space-saving changes automatically and squeeze even more information onto one page.

Works with All Versions of Org Plus

Org Plus is the only award-winning org chart solution that has DOS, Windows, and Macintosh versions available.

"Org Plus For Windows has a decided advantage [over its Windows competitor] with the Make Fit command, the in-chart picture printing, and its number of styles."

— Greg Keizer, PC Magazine
April 29, 1992

FREE Corporate Evaluator's Guide

Call now to order your free Corporate Evaluator's Guide and see for yourself why Org Plus For Windows has the edge! Org Plus For Windows' suggested list price, \$199.99.

Call: 510-794-6850 Fax: 510-794-9152

Banner Blue
SOFTWARE

P.O. Box 7865, Fremont, CA 94537

PC0992

Org Plus is a registered trademark of Banner Blue Software, Incorporated. Windows is a trademark and Macintosh is a registered trademark of Microsoft Corporation. Adobe Type Manager is a trademark of Adobe Systems Incorporated. PC Magazine Editors' Choice is a registered trademark of PC Magazine, Inc. © 1992 Banner Blue Software, Incorporated. All rights reserved.

CIRCLE 351 ON READER SERVICE CARD

► SUMMARY OF FEATURES

Products listed in order as reviewed



■ = YES □ = NO

	Aldus PhotoStyler	Image-In-Color	Image-In-Color Professional	ImagePals	PhotoFinish	Publisher's Paintbrush
Input Device Support (continued)						
Hewlett-Packard:						
ScanJet/ScanJet Plus	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
ScanJet IIc/IIp	■ □	■ □	■ □	■ □	■ □	■ □
Microtek ScanMaker 600Z	■	■	■	■	■	■
Mustek MFS-300C	■	■	■	■	■	■
Panasonic	□	■	■	□	■	■
Ricoh	□	■	■	□	■	■
Sharp	■	■	■	■	■	■
Umax	□	■	■	□	□	□
TWAIN*	□	□	□	■	■	■
Input device calibration	□	■	■	□	□	■
Output Device Support						
Film recorders	Windows-compatible	Windows-compatible	Windows-compatible	Windows-compatible	Windows-compatible	Windows-compatible
Printers	Windows-compatible	Windows-compatible	Windows-compatible	Windows-compatible (except PostScript Level 2)	Windows-compatible	Windows-compatible
Print options:						
Trim marks/Registration marks	■ ■	■ ■	■ ■	□ □	□ □	□ □
Print film negatives	■	■	■	□	■	■
Print selected area	□	■	■	□	□	□
Step scale	■	■	■	□	■	□
Specify:						
Emulsion orientation	□	■	■	□	□	□
Halftones	■	■	■	□	■	■
Dot shape	■	■	■	N/A	□	■
Frequency	■	■	■	N/A	□	■
Image size	□	■	■	□	■	■
Margins	□	□	□	□	□	■
Resolution	■	□	□	■	■	■
Tile across pages	□	■	■	□	■	■
Output device calibration	■	■	■	□	□	■
Color separation	■	□	■	□	□	□
Dot-gain compensation	□	N/A	■	N/A	N/A	N/A
Gray-component replacement (GCR)	■	N/A	■	N/A	N/A	N/A
Under-color removal (UCR) and black generation	■	N/A	■	N/A	N/A	N/A
Independently specify CMYK channels (frequency and angle)	■	N/A	■	N/A	N/A	N/A
User-specified absorptions	□	N/A	■	N/A	N/A	N/A
Print individual plate	■	N/A	■	N/A	N/A	N/A
Print separation labels/step scale	■ ■	N/A	□ □	N/A	N/A	N/A
Support						
On-line help	■	■	■	■	■	■
Toll-free technical support (Eastern time)	None	10:00-7:00	10:00-7:00	None	None	None
Free technical support (Eastern time)	10:00-8:00, first 90 days	10:00-7:00	10:00-7:00	11:30-8:30	9:00-6:00	9:00-6:00
BBS	CompuServe	CompuServe	CompuServe	None	Company-run	Company-run

* Scanners not explicitly supported may be accessed through TWAIN N/A—Not applicable The product does not have this feature

Image-Editing Software



Picture
Publisher

PixoFoto

ble approach, but it requires some getting used to.

PixoFoto offers all the standard tools you will need to finesse an image, including a paintbrush, airbrush, clone brush, paint bucket, and rubber stamp. All of these tools allow you to set the brush size and shape via a dialog box, and the airbrush allows you to change the rate of flow. PixoFoto even one-ups most of the competition by providing a Bezier curve tool. You can fill the curve with any of the brushes, which proved quite handy for creating the roadway in our test image



of a car traveling through the countryside.

PixoFoto includes all the usual selection tools—rectangle, ellipse, polygon, magic wand, and freehand—and

unlike some other programs in this review, lets you move, resize, and rotate selections. What it doesn't provide is an attractive selection of fonts. Those that the program offers are available only in limited point sizes. On the plus side, once text is placed on the image, you can select it and apply effects such as slant, distort, and perspective, much as you would apply them to any selection.

The program distinguishes itself with its pixel-settings options, which you can apply to any of the drawing tools in lieu of using the foreground color. For instance, you may want to use the paintbrush to cover over any pixels in an image that have a higher or lower color value; simply select the Minimum or Maximum options. A whole list of Boolean commands such as AND, OR, NAND, and XOR provide other ways to apply color. You can also reduce the Opacity level to lend your work a transparent effect.

SUITABILITY TO TASK

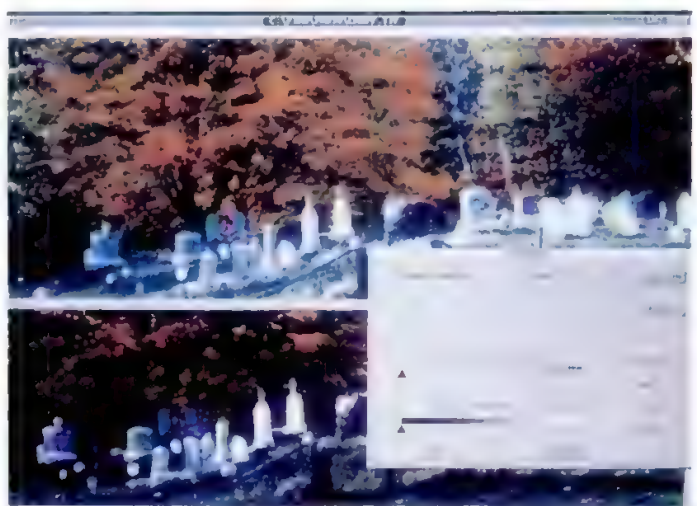
PixoFoto

	POOR	FAIR	GOOD	EXCELLENT
Photo retouching	●	●	●	○
Creative editing	●	●	●	○
Hard-copy output	●	○	○	○
Electronic output	●	●	●	○

While interpreting histograms isn't any easier with PixoFoto than it is with most other programs that are reviewed here, options for setting the hue, saturation, brightness, and contrast are easy to manipulate. Sliding markers allow you to make the settings, while preview options provide you with a foretaste of the outcome.

NOT UP TO PAR

In other respects, PixoFoto falls short of the mark. For instance, it is one of the few programs in this review that does not offer any calibration options. More seriously, the program was unable to print via the parallel port to either one of our test-bed printers, a QMS ColorScript 100 Model 10 and an HP LaserJet Series III. In the case of printing a PostScript test file to the QMS printer, the program appeared to send down and rasterize the data, but was unable to produce output. The company said it had previously tested the program with this printer and found no problems. It suggested operat-



To change the brightness levels for the highlight, midtone, and shadow areas of this image, PixoFoto gives you the option of squeezing parts of the input distribution based on a histogram (bottom image) or automatically equalizing by luminosity (top image). Equalizing by luminosity gave a surreal quality to the image.

ENDS

GET NONSTOP SYSTEMS INFORMATION... AND 2 DISKS - FREE!



Don't miss a single product report or productivity-enhancing tip — subscribe to PC Magazine today. You'll get 22 issues for only \$29.97 — that's 54% off the \$64.90 cover price!

Order now and you'll also get PC Magazine's **"Power Utilities for the '90s"** on 2 disks — **FREE** with your paid subscription! These state-of-the-art utilities for the new generation feature a modular menu, and Systems, Windows and Laptop enhancers to boot! This exclusive software is available *only* to new subscribers!

**Call toll-free today:
1-800-289-0429**

Basic one-year subscription \$44.97; on newsstands \$64.90. Canada and foreign add \$32.00. U.S. funds only. Canada GST included. Please allow 30 days for shipment of first issue. **FREE** disks will be sent upon payment.

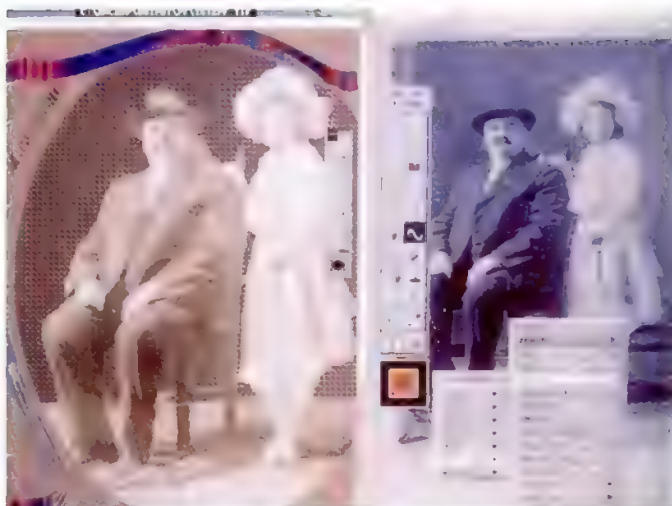
GRAPHICS

Image-Editing Software

ing the printer in serial mode; we did not have time to try this. Furthermore, the program only supports the LaserJet if it is equipped with a PostScript cartridge.

PixoFoto also suffered from erratic performance times when tested with Opta's Mona Lisa 24-bit Color Display Board on our Compaq testbed, equipped with 16MB RAM and QEMM-386. Compared with the other products in this review, which were tested with the admittedly faster 24-bit Matrox Impression/AT graphics adapter (which PixoFoto does not support in this version), the software's performance was poor on most of our tests. The software still choked on 15MB files when equipped with 32MB of RAM, although working with smaller files was fast. PixoArts claims that it uses files as large as 15MB all the time, without any speed problems.

The program also exhibited one bug that could drive a user who had just spent hours perfecting an image off the deep end. Somehow, a copy of the toolbox was inadvertently rendered onto one of our



In the image on the left in this screenshot, we were able to achieve the ribbon effect by constructing a Bezier curve and then applying a red custom brush at 90 percent opacity and the Add pixel setting. PixoFoto's text handling was not up to this task; the package comes with a somewhat limited set of fairly unattractive bitmapped fonts.

test images, and the file was saved before the glitch was noted.

Other problems are really just inconveniences rather than real flaws. You can crop, but it takes a little bit of effort to understand how PixoFoto actually implements cropping. Additionally, the program does not support LZW-compressed TIFF files, probably one of the more common compression schemes. Additionally, it does not support Hewlett-Packard ScanJet systems, though they will be supported in the upcoming PixoFoto 1.1. This version will also add support for Epson scanners and non-TIGA-based graphics adapters.

Perhaps the area where PixoFoto fails its users most seriously is in its documentation. Locked within this program are many powerful features, but the manuals' attempts to explain them are more problematic than useful. Almost as bad, you're never quite sure where to turn for information; the quick-reference manual, which is essential in order to remember the myriad of controls, explains features that the main reference manual doesn't even mention.

PixoFoto is obviously a program with potential, but it is not ready for prime time yet. PixoArts would do well to fix its bugs, improve its drivers, and overhaul its manual. That, and a lower price, could make the next version of PixoFoto one to watch. □

FACT FILE

PixoFoto, Version 1.0

PixoArts Corp., 4600 Bohannon Dr., #220,
Menlo Park, CA 94025; 415-323-6592;
fax, 415-323-4434

List Price: \$895.

Requires: 640K RAM, 20MB hard disk, TIGA graphics board, DOS 2.0 or later, mouse. Recommended: RAM twice the size of images to be edited.

In Short: Although PixoFoto offers the expected range of image-editing tools and even provides high-end features such as Bezier curves and pixel settings options, the current version is too expensive, too erratic, and too quirky to merit your interest.



ON READER SERVICE CARD

We Are to Notebooks
What Griselda of Skyland
Was to Pomeranians:



The Lightest!

COMPUDYNE

THE LOWEST OF THE LOW PRICES
GUARANTEED

Compudyne™ Notebooks. More Of What

ACTUAL SIZE. ONLY 1.5" THICK, 5.5LBS,
INCLUDING BATTERY. NO KIDDING!

- Full 10", VGA screen with 640 x 480 resolution, 64 grayscale, brilliant LCD and ultra fast 150 MS response time. (No more disappearing mouse pointer!)



- Every Compudyne Notebook comes pre-loaded with MS/DOS™ 5.0, Microsoft® Windows™ 3.1 & Polaris PackRat™ 4.0 Personal Information Manager!

• Fax/Modem

- Memory Modules
- Co-Processor

- Install add-ons in seconds! No more screwdrivers!

- Ultra long-life 24 watt battery pack with 12 AA NiCads.
- Stand-by battery on 386 models lets you change batteries without switching off!

- Built-in trackball.

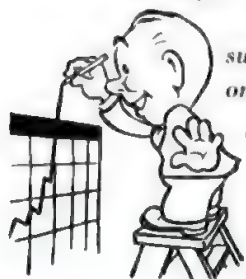
- Internal 3.5", 1.44 MB floppy drive.

- Full size (84/85 key) keyboard with 36 function keys, including dedicated 'Page Up/Down', 'Home' & 'End' keys. A delight for spreadsheets!

You Want. Less of What you Don't.



Compudyne is the PC manufacturing and direct marketing arm of Comp USA™ - The Computer SuperStore (NASDAQ symbol: CUSA) - inventors of big volume, deep discounting PC retailing, and the largest chain of computer super stores in the country.



We manufacture top quality, fully-supported computers as available from only the largest PC manufacturers at prices typically found only at garage shop clone houses.

Result? We're already one of the largest direct PC companies in the country!

OPTIONS:

- Math Co-Processor
- Spare NiCad Battery
- Memory Upgrades
2 or 4 MB on 386,
4 or 16 MB on 486
- 2400 bps Data Modems with
4800 bps send-only FAX, or
MNP-5 & 9600 bps send/receive FAX
- External 5 25" Floppy Drive
- External Numeric Keypad
- Expansion Station
- Auto Adapter & Battery Charger
- Standard or Leather Carrying Bag

SUPPORT & WARRANTIES:

- 30-day no questions asked return policy**
- Toll-free telephone technical support
- 1 year limited warranty on parts and labor
- Overnight replacement if needed

ORDERING:

- Order toll-free: **1-800-932-2667**
8am-7pm (CST) Mon-Fri;
9am-4pm (CST) Sat.
- International callers dial: **1-214-702-0055**
- 24 hour FAX: **1-214-702-0300**
- Ask about corporate credit and volume discount terms!



PCM0924



Notebook	CPU	RAM MBs.	HD MBs.	Battery Life Hrs.	Price
386SXL/25	386SXL-25 MHz Optional 80387SX	2 standard 4 & 6 options	60	3+	\$1,599 \$59/mo*
386SL/25	Intel 80386SL-25 MHz 64 K CPU cache Advanced SL power mgmt Optional 80387SX co-processor	2 standard 4 & 6 options	80	3+	\$1,899 \$70/mo*
486SX/25	Intel 80486SX-25 MHz Built-in 8K CPU cache	4 standard 8 & 20 options	80	2.5+	\$2,199 \$81/mo*
486DX/33	Intel 80486DX-33 MHz Built-in 8K CPU cache	as above	120	2.5+	\$2,999 \$111/mo*



THE LOWEST OF THE LOW PRICES. GUARANTEED.
Compudyne Direct, 15151 A Surveyor Addison TX 75244

™/® trademarks are the property of their registered owners. Compudyne Direct, 15151 A Surveyor Addison TX 75244

*Leasing through Leasing Group, Inc. payments based on 36 month open-end rate **Must be returned 'as-new' in the original packaging

CIRCLE 357 ON READER SERVICE CARD

Introducing Video Blaster. Now A Picture Is Worth Just \$495.



Here's everything you need for full-motion video, image capture, graphic overlays, even special effects. All the hardware, all the software, all in one box, all for just \$495.

It starts with Video Blaster™, an internal video card that lets you display and manip-



and special effects to create interactive presentations and multimedia training applications.

There's also a Windows-based Video

Kit with JPEG compression that lets you capture images and use them to spice up your DTP, database and WP applications.

And with over two million colors and video control of hue, saturation, brightness, contrast and RGB, you'll have enough video capability to

ulate full-motion NTSC or PAL video on a standard PC monitor. And it lets you input and mix sound from multiple audio sources.

You also get MacroMind® Action!™ for Windows™ and Tempra™ for DOS. Both combine video with computer graphics

make even the MTV guys jealous.

So visit your local retailer or call us at 1-800-998-LABS. You'll get the picture on affordable multimedia video.



Video Blaster is a trademark of Creative Labs, Inc. All other marks are owned by their respective companies. © 1992 Creative Labs, Inc. All rights reserved.
International Inquiries: Creative Technology, Ltd., Singapore Tel 65-773-0233 Fax 65-773-0353

CIRCLE 086 ON READER SERVICE CARD



VGA-TO-NTSC BOARDS

Let's Go to The Videotape

Until digitized video becomes practical for mass distribution, videotape will remain the most efficient and accessible medium. These eight boards let corporate professionals combine computer-generated titles and graphics with videos.

PC users live in insulated little worlds. For the most part, we exchange information via floppy disks or over a network; in order to communicate with the unequipped, we generally resort to hardcopy. But hardcopy doesn't make sense for many applications, such as training, product demonstrations, or any presentation that would benefit from extensive visual elements.

For applications like these, videotape is a fairly complicated medium to work with, but an ultimately more satisfying

IN THIS REVIEW	
<i>ADDA VGA-AVer</i>	258
<i>Aitech ProVGA/TV Plus</i>	263
<i>Cardinal SNAPplus</i>	269
<i>Everex Vision VGA with Overlay</i>	277
<i>Genoa VGA2TV</i>	278
<i>Magni VGA Producer Pro</i>	278
<i>Truevision VideoVGA</i>	283
<i>Willow VGA-TV GE/O</i>	289



by Lori Grunin

VGA-to-NTSC Boards

method of distribution, and one that's widely available. There are over 350 million VCRs in use worldwide, according to Video Systems magazine, compared with DataQuest's estimate of only 128.2 million microcomputers. (DataQuest is a research firm in Cupertino, California.)

REVIEW CRITERIA

Whether you're a corporate professional who wants to distribute a sophisticated multimedia presentation that includes video clips, or simply a hobbyist who wants to add titles to a home video, you will need a board that can integrate PC graphics and video. For this review, we looked at eight adapters that allow you to overlay PC graphics on an input video source and output the combination onto tape. They range in price from \$499 to \$1,995. We also required that the boards support generator locking—a signal synchronization technique generally referred to as *genlocking*. Genlocking is essential to creating a stable signal when overlaying PC graphics with video.

The price of these products varies widely, but it's clear that you get what you

pay for; the \$1,995 Magni VGA Producer Pro is not only the most expensive product in the group, it is the best.

WorldWide Video (which was formerly USVideo) was updating its \$399 VGA/NTSC Recordable at review time; the new version should be available by the time you read this. Another product, IEV International's \$695 VGA Broadcaster, requires an external box for overlays that did not ship in time for our testing.

The VGA-to-NTSC boards we reviewed here are not the only products available that let you bridge the gap between the PC and video. For simply converting a VGA signal into an NTSC (National Television System Committee) signal—a process called *scan conversion*—you don't need the overlay or genlocking capabilities that the boards looked at in the main review offer. For

more information on scan converters, see the sidebar "For Scan Conversion Only."

In contrast to genlock/overlay boards and simple scan converters whose signals run from the PC to a TV or videotape recorder, *video-in-a-window boards* (the grandchildren of frame grabbers) let you display video on your VGA monitor and perform operations like pans, zooms, and crops using your PC. We discuss these offerings in the sidebar "Video in a Window: Bringing Video to Your PC."

The only VGA-to-NTSC board in this review that lets you do this is the Cardinal SNAPplus, which the company designed as a multimedia jack of all trades.

FLICKER AND JITTER

The fundamental technology for these VGA-to-NTSC boards hasn't changed all that much in the two years since we last reviewed this category ("From VGA to NTSC: Putting Your PC on Tape," *PC Magazine*, July 1990). Most of the engineering efforts of the companies involved have been directed toward countering the twin terrors of scan conversion: *flicker* and *jitter*.

Anyone who has worked on a PC display with a refresh rate under 60 Hz has a visceral understanding of flicker. On a TV, two 262.5-line *fields* are interlaced to produce 30 525-line *frames* per second, as dictated by the RS-170A specification (the guidelines for broadcast TV set out by the NTSC). So, while the frame refresh is 60 Hz, the effective refresh is about half that. The combination of an ergonomically uncomfortable refresh rate and field interlacing results in a severe strobing effect, or flicker.

The reason many people don't notice the flicker while watching TV is that the picture is composed of thousands of colors and is constantly changing. But just try watching thin lines or black text on a white background; you can't help but notice the flicker.

The VGA-to-NTSC vendors' efforts to fight flicker are not always successful. ADDA Technologies, Aitech Interna-

It's clear that you get what you pay for: The most expensive of the group, the Magni VGA Producer Pro, is also the best.

HIGHLIGHTS

VGA-to-NTSC Boards

A VGA-TO-NTSC BOARD lets you overlay PC graphics on an input video source and output the combination onto videotape. This provides a solution for corporate users who may want to use it for such things as distributing a multimedia presentation complete with video clips or adding titles to a videocassette-based training program.

THE EIGHT ADAPTERS in this review support *genlocking*, a signal synchronization technique essential to creating a stable signal when overlaying PC graphics with video.

THE PRICES for these eight VGA-to-NTSC boards range from \$499 for the Genoa VGA2TV to \$1,995 for the Magni VGA Producer Pro. Quality comes at a price for this crop of products; the Magni receives our Editors' Choice.

PC MAGAZINE LABS tested each board's output noise level (with genlocking turned both off and on), gain (a significant loss in signal strength can result in loss of brightness on composite video output), high-frequency response (decibel loss at any frequency level indicates some loss of image sharpness), and subcarrier horizontal phase and phase shift (which measure the accuracy of the color subcarrier for timing and color reproduction, respectively).

TWO OTHER CATEGORIES of boards let you merge the worlds of PC graphics and video. Scan converters simply convert a VGA signal to an NTSC signal; they don't provide overlay capabilities. Video-in-a-window boards (NTSC-to-VGA cards) do the reverse of the products in the main review; they let you display video on a VGA monitor.



▶ EDITORS' CHOICE

• Magni VGA Producer Pro

tional Corp., and Everex Systems include anti-flicker filters in their products, but this solution tends to be impractical or not very effective. Only Magni Systems has managed to provide an effective and practical anti-flicker solution in its board. If you're planning to tape a Windows screen, with its wealth of 1-pixel-wide lines, good anti-flicker technology such as the Magni offers is invaluable.

While jitter's symptoms resemble flicker—perceptible movement along the border of scan lines—the causes are quite different. Unlike today's analog monitors, which send red, green, blue, and synchronization information along separate wires, the signal going into a TV combines *luminance* (brightness or gray scale, denoted by a Y), *chrominance* (color, denoted by a C) and synchronization information all in one; thus, the term *composite* video.

To decode an incoming signal, an NTSC monitor must extract the chrominance channel's phase angle (for the hue) and amplitude (for the saturation). Since a change in the amplitude and angle of a signal—which indicates 'a color change—cannot happen instantaneously, ambiguity (or an artifact) is introduced. Mechanical imperfections can cause imperfections in the signal, which is then improperly decoded and results in jitter. The Everex Vision VGA with Overlay and the Magni are the only two products that offer anti-jitter filters, though the Everex's implementation was not particularly effective.

Another noise-induced artifact is *crosstalk*, which comes in two flavors: Y/C crosstalk and C/Y crosstalk. The former, also called *buzz*, looks like rolling black and white beads and occurs because a rapid transition in color—an instantaneous change in the wave's phase—is decoded as a transition in luminance. You can minimize this by choosing less saturated colors and avoiding drastic jumps in hue.

With C/Y crosstalk (also called *cross-color*), rapid changes in luminance are decoded as changes in hue. Thus, black and white stripes (or any regularly spaced pattern) will appear to have a colored border between them.

Because the decoding process is so sensitive to the amplitude and frequency

When it comes to VGA-to-NTSC products, money can buy you something: excellence. The eight products in this roundup range in price from the \$499 Genoa VGA2TV to the \$1,995 Magni VGA Producer Pro. As it did when it received our Editors'

Choice award in our July 1990 issue, the Magni is once again worth an expensive price tag. Exemplary performance, anti-jitter and anti-flicker options, and controls for everything from panning to fading make this the choice for corporate users and other serious desktop video professionals.

In an arena where most products output 640-by-480 graphics with up to 256 simultaneous colors for composite video recording and display, the Magni can output 768-by-480 graphics with 256 colors. Unlike most, it doesn't suffer from noticeable over-scan problems. Its genlocking abilities were admirable and its performance on our tests impressive. Low noise, excellent response to frequencies up to 4.1 MHz, and consistently bright images on NTSC displays are a big part of the product's attraction.

Admittedly, accessing the range of features available via the external control box takes some effort to learn. A software utility that lets you save settings to a configuration file for easy recall goes a long way toward helping solve this problem, though. With the Magni, you will also have to factor in the cost of an additional VGA board. But all in all, the Magni can't be beat for its quality and performance.

Other products in this review are worthy of an honorable mention. High marks on our video performance tests in particular distinguish the \$1,195 Truevision VideoVGA, as does good color fidelity and fine performance in genlocking mode (with the exception of a brief loss of the genlock when switching between graphics programs). Although it does provide on-

board VGA, the Truevision does not offer some more important extras. For example, only the Genoa VGA2TV and the Truevision lack controls for horizontal and vertical positioning, and the absence of anti-jitter and anti-flicker filters are noticeable when overlaying Windows graphics. A good product as it stands, the addition of features like these could move the Truevision up to the Magni's level.

We give the \$1,295 Cardinal SNAPplus credit for being the most well-rounded. In addition to its VGA-to-NTSC duties, it supports PAL video sources, offers on-board VGA, captures live video images, plays graphics animation, and functions as a video-in-a-window product. Because it digitizes the NTSC video, the Cardinal was the only product that did not require an NTSC monitor. The Cardinal, however, did not perform well on all our tests. It showed a significant loss of signal strength, and its frequency response dropped off after 2.0 MHz, making it a questionable choice if you're using Super VHS sources or better. In its favor, though, hands-on testing with S-VHS equipment produced fairly good images.

Finally, the \$645 ADDA VGA-AVer gets a nod for being low-cost if somewhat flawed. Respectable performance on our video tests and support for audio pass-through are pluses, but flicker (with no practical way to control it) and images that aren't as clear as they could be are problems. Even so, the ADDA's low price and decent performance make it a fine choice for users who want an inexpensive way to explore this technology.

of the signal, these waveform elements are crucial considerations in the quality of the scan conversion process.

The most obvious indication that your board isn't genlocking properly is rolling or tearing of the picture. None of the boards we looked at had this problem. It is possible that you won't ever witness any significant degradation in image quality, despite a poorly behaved signal. If, for example, you're using simple im-

ages with colors that are easily reproducible by the NTSC phosphors, you may never notice any color shift.

PERFORMANCE RESULTS

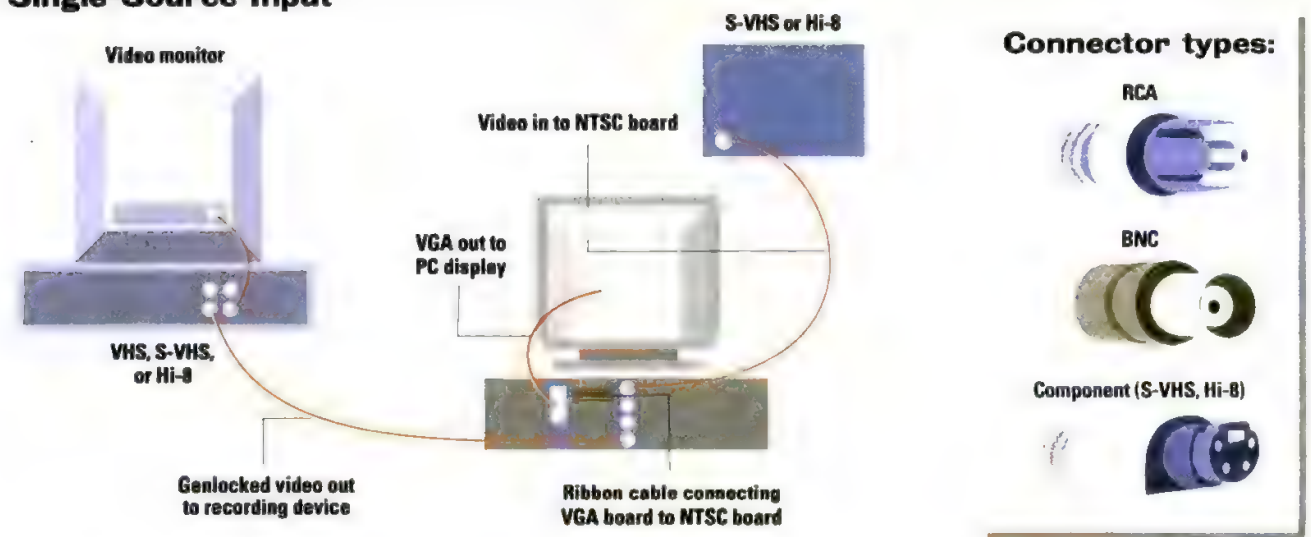
PC Magazine Labs tested the VGA-to-NTSC products for output signal timing problems, color purity, noise, gain, and frequency response. The Subcarrier Horizontal Phase test measures the accuracy with which the boards control the timing

of the color subcarrier, an important consideration if you want to integrate two sources of video. While the RS-170A specification dictates a phase margin of ± 40 degrees, today's equipment is accurate to within ± 10 degrees.

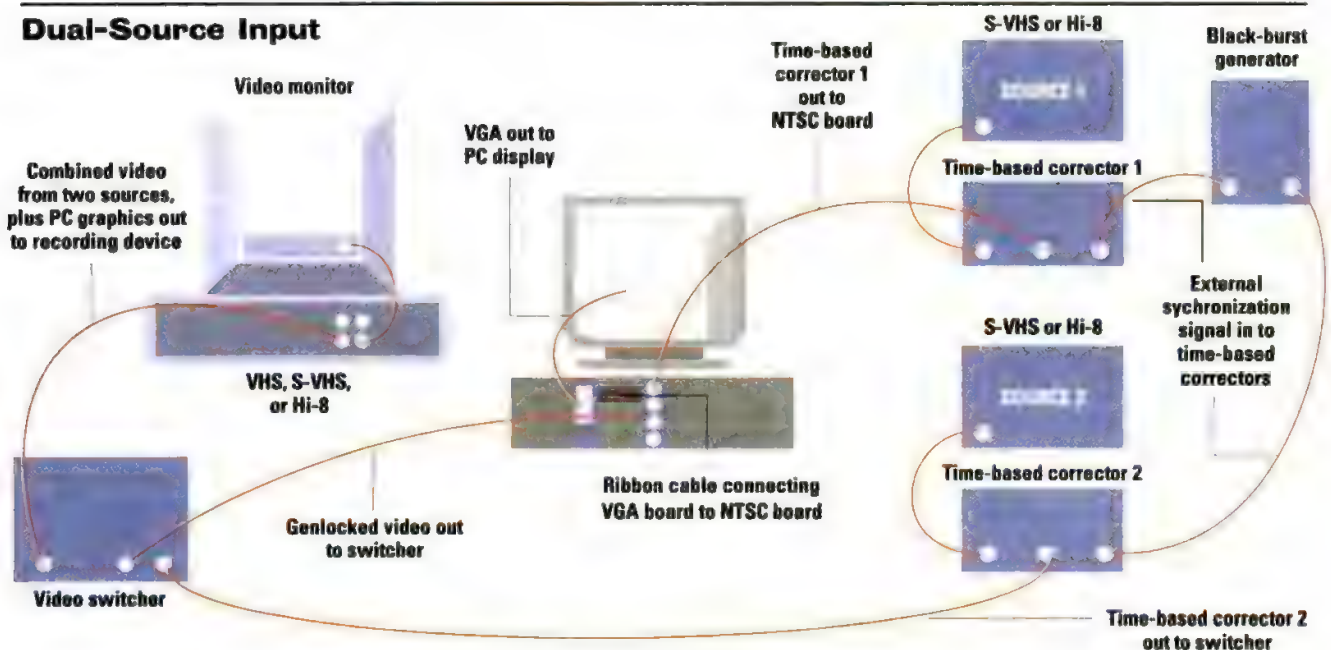
The Magni VGA Producer Pro and the Truevision VideoVGA excelled on this test, at 0.4 and 0.3 degrees, respectively. The Aitech ProVGA/TV Plus and the Everex Vision VGA with Overlay

Anatomy of a VGA-to-NTSC System

Single-Source Input



Dual-Source Input





Performance Tests: VGA-to-NTSC Boards

Across the board, the Magni VGA Producer Pro and the Truevision VideoVGA offered top performance. Some products were too unstable on our Subcarrier Horizontal Phase and Phase Shift tests to produce results.

	HIGH-FREQUENCY RESPONSE							Subcarrier Horizontal Phase (degrees)	Phase Shift (degrees)
	Noise-F (dB RMS)	Noise-G (dB RMS)	Gain (IRE)	1.25 MHz (dB)	2.0 MHz (dB)	3.0 MHz (dB)	4.1 MHz (dB)		
ADDA VGA-AVer	-54.5	-57.9	102	-0.04	-0.02	0.10	0.30	-4.4	0
Aitech ProVGA/TV Plus	-56.6	-50.1	90	-1.24	-3.03	-0.41	-1.67	83.7	N/A
Cardinal SNAPplus	-53.6	-53.1	69	-0.75	-2.27	-6.41	-10.55	N/A	N/A
Everex Vision VGA with Overlay	-48.8	-48.0	75	-0.67	-3.82	-7.60	-0.09	-53.0	N/A
Genoa VGA2TV	-33.4	-51.7	104	-1.33	-16.75	-0.35	-0.63	N/A	N/A
Magni VGA Producer Pro	-62.3	-61.5	103	-0.02	-0.03	-0.02	-0.07	0.4	2
Truevision VideoVGA	-54.8	-78.1	95	-0.05	-0.08	-0.07	-0.09	0.3	0
Willow VGA-TV GE/O	-43.7	-57.8	105	-0.25	-0.37	-0.44	-0.38	1.0	0
OPTIMAL VALUES FOR EACH TEST	Larger negative numbers	Larger negative numbers	100	-3 to 3	-3 to 3	-3 to 3	-3 to 3	-10 to 10	0 to 5

N/A—Not applicable. For this test, the board's signal was unstable, so we were unable to record results.

HOW WE TESTED

For this roundup of VGA-to-NTSC products, we used a Tektronix VM 700A Video Measurement Set (a device similar to a digital oscilloscope but specifically designed for video testing) and a Tektronix VITS 200 signal generator to create baseline signals. We used a Compaq Deskpro 386/25e with a 310MB hard disk, 8MB of memory, and a Sony GVM-1300 multiscanning monitor as our test-bed PC.

The visual differences between good and poor performance show up in the crispness of the on-screen image, the intensity and accuracy of the colors, or both.

When looking at the High Frequency Response tests, keep in mind that ordinary VCR performance drops significantly at about 2 MHz, the best Super VHS equipment starts to fall off at about 4.2 MHz, and top-of-the line TV monitors are good to about 7 MHz.

The **Noise-F** and **Noise-G** tests measure the peak-to-

peak noise level in free-run (normal) and genlocked modes, respectively. This value is the ratio of the bar amplitude to the unweighted RMS (root mean square) amplitude of the noise on a quiet line, using a 5.0-MHz low-pass filter. Smaller numbers represent better performance.

The **Gain** test reports the absolute amplitude difference between the input signal generated by the VITS 200 and fed into the VGA-to-NTSC product, and the resulting output signal from the VGA-to-NTSC device. The closer the result to 100 IRE units, the better. One IRE (Institute of Radio Engineers) unit is equal to $\frac{1}{140}$ the NTSC signal's amplitude.

The **High-Frequency Response** test indirectly assesses video resolution. It records the amplitude loss when an audible NTSC signal is generated at 1.25, 2.0, 3.0, and 4.1 MHz. We run this test with genlocking acti-

vated. In this case, higher frequencies without significant signal degradation means a clearer image. The acceptable test result range is from -3 to 3 decibels.

The **Subcarrier Horizontal Phase** test, which we run with genlocking activated, indicates the relationship of the color subcarrier phase to the start of the horizontal sync. (The subcarrier is a sine wave whose amplitude and phase convey color information.) This test measures timing problems that would be noticed only when merging the output signal with an input signal. The acceptable test result is 0 (± 10.0) degrees.

The **Phase Shift** test measures the largest phase difference between any two staircase chrominance packets, and it indicates color accuracy. An error of more than 5 degrees would be a noticeable shift. This test also indicates your video monitor's color purity: Results close to 0 indicate purer colors.

both performed poorly on this test, with exceptionally high results of 83.7 degrees and -53.0 degrees, respectively. The Cardinal SNAPplus and the Genoa VGA2TV both failed this test; they were too unstable to produce a reading.

The Phase Shift test measures the accuracy of the color reproduction. The more the subcarrier's phase diverges from the expected, the more "off" your colors will look. The ADDA, Magni, Truevision, and Willow boards performed within an acceptable range; the rest were too unstable to produce a result.

On their own, VGA-to-NTSC boards tend to produce a substandard NTSC sig-

nal, but they can compensate for this by extracting reference waveform information from an input video source. Without a video source from which to derive a reference—free-run mode—the Genoa had the most noise (-33.4 dB RMS) on our Noise-F test, indicating substantial signal falloff; the noise lessened when we genlocked the board to a video source (-51.7 dB RMS) on our Noise-G test, but these results still couldn't compare to most of the competition. The Magni, on the other hand, proved to have the quietest free-run signal (-62.3 dB RMS) and the second-quietest genlocked signal (-61.5 dB RMS). The Truevision attained the

lowest noise level when genlocked to an incoming source (-78.1 dB).

The boards' high-frequency response also indicates their signal processing quality. The RS-170A bandwidth specification for broadcast video is 4.2 MHz. By feeding the boards higher and higher frequency input signals until we almost completely match the bandwidth (4.1 MHz), we can tell at which point the output signal begins to decay, and thus at which point image detail will begin to suffer.

The results of the High-Frequency Response tests show an expected decibel loss at higher-frequency levels for most of these devices. Some of the boards, such

Talk about low

1990 and 1991 World Class Awards
for Best Mail-Order Company



□ 3 1/2" format available from us. Specify when ordering.

▣ package includes both 5 1/4" and 3 1/2" disks.

▣ 3 1/2" format available from manufacturer by request. Call us for details.

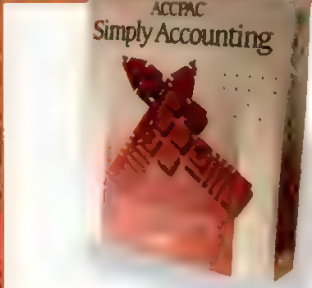
CP—copy-protected; NCP—not copy-protected.

The four-digit number next to each product is the product's ITEM NUMBER. Please refer to this number when ordering. Thank you.

SOFTWARE

We carry only the latest versions of products. Version numbers are current at press time. Products listed here in red are Microsoft Windows Applications.

Abacadata ... NCP	
5591	▣ Everybody's Planner 2.0..... \$49.
AddStor ... NCP	
4090	▣ SuperStor 2.0..... 79.
Adobe Systems ... NCP	
7547	▣ Adobe Type Manager 2.0 for Windows 65.
6591	▣ Adobe Illustrator 4.0 for Windows..... 389.
5988	▣ Adobe Illustrator Competitive Upgrade 189.
7940	▣ Adobe Type Set Value Pack..... 39.
(Entire Adobe Type Library, from 1 to 275 is available. Call for more information.)	
Aldus ... NCP	
8000	▣ Persuasion 2.1 for Windows..... 329.
1332	▣ PageMaker 4.2 for Windows..... 499.
6223	▣ Gallery Effects for Windows..... 139.
7540	▣ IntelliDraw..... 199.
Alpha Software ... NCP	
5104	▣ Alpha FOUR 2.0..... 329.
Application Techniques ... NCP	
8337	▣ WinDings 1.0 for Windows..... 49.
1214	▣ Pizazz Plus 3.0..... 79.
Approach Software ... NCP	
6598	▣ Approach 1.0 for Windows..... 265.
Ares Software ... NCP	
6030	▣ FontMonger 1.0 for Windows..... 95.
Artisoft ... NCP	
2455	Lantastic AE-2 EtherNet Starter Kit 4.1 (incl. software, 2 EtherNet cards, cable) 479.
2452	AE-2 EtherNet Adapter Card..... 199.



Computer Associates ... NCP

5779 ▣ ACCPAC Simply Accounting for Windows

—Easy-to-use entry level accounting software. Includes General Ledger, A/R, A/P, Payroll, Inventory Control, & Job Costing. Includes a primer & an extensive list of features **\$119.**

Atech Software ... NCP	
4797	▣ AllType 2.0 (universal typeface converter) \$45.
5708	▣ FastFonts DOS 57. 5718 Windows. 57.
Automap... NCP	
2729	▣ Automap 2.0..... 49.
6700	▣ Automap Europe 2.0..... 75.
Avery Dennison ... NCP	
6006	▣ Label Pro 1.6 (Laser)..... 49.
7336	▣ Label Pro 1.6 for Dot Matrix..... 49.
Banner Blue Software ... NCP	
2088	▣ Org Plus 1.0 for Windows..... 125.
Berkeley Systems ... NCP	
9885	▣ After Dark 2.0 for Windows..... 29.
Bitstream ... NCP	
7568	▣ FaceLift 2.0 for Windows 2.x/3.0..... 59.
8040	▣ FaceLift 1.5 for WordPerfect 5.0/5.1..... 59.
6066	▣ TrueType Font Pack for Windows 3.1..... 49.
2089	▣ MakeUp 1.0 for Windows 3.0/3.1..... 95.
Borland International ... NCP	
6242	▣ Quattro Pro 4.0..... 319.
9695	▣ Borland C++ 3.0..... 325.
1514	▣ Paradox 3.5..... 499.
9635	▣ Object Vision 2.0..... 99.
Broderbund ... NCP	
1434	▣ New Print Shop..... 35.
ButtonWare ... NCP	
6419	▣ PC-File 6.5..... 65.
Caere ... NCP	
6568	▣ OmniPage Direct 1.0..... 259.
8933	▣ OmniPage Professional 2.0..... 649.



Adobe Systems ... NCP

5988 ▣ Adobe Illustrator 4.0 Competitive Upgrade—

Owners of draw/design programs can trade up to Illustrator 4.0. Incl. TypeAlign, ATM, Separator, 40 fonts, pre-drawn artwork, & more... **\$189.**

6591 ▣ Adobe Illustrator 4.0 for Windows **389.**

Calera ... NCP	
1769	▣ Fax Grabber 1.1..... 99.
1953	▣ WordScan Plus 1.1..... 429.
Central Point ... NCP	
5039	▣ PC Tools 7.1..... 115.
6447	▣ PC Tools 7.1/AntiVirus 1.2 Bundle..... 144.
9751	▣ AntiVirus 1.2..... 84.
8114	▣ Backup 7.1 (DOS and Windows)..... 84.
Clear Software ... NCP	
5987	▣ AllClear 1.0..... 179.
CompuServe ... NCP	
7546	▣ DOS Membership Kit 1.3..... 25.
Computer Associates ... NCP	
5779	▣ ACCPAC Simply Accounting for Windows 119.
3814	▣ BFAST (3 1/2" only)..... 339.
Concentric Data Systems ... NCP	
6575	▣ R & R Relational Report Writer 4.0.... 159.
Contact Software ... NCP	
1625	▣ Act! 2.1..... 229.
Corel Systems ... NCP	
5506	▣ CorelDRAW! 3.0..... 395.
Data Storm ... NCP	
4798	▣ PROCOMM PLUS 2.01..... 69.
6918	▣ PROCOMM PLUS 1.0 for Windows.... 85.
DCA/Crosstalk ... NCP	
5611	▣ Crosstalk 1.2 for Windows..... 119.
2909	▣ Crosstalk Mk 4 2.0..... 139.



Adobe Systems ... NCP

7940 ▣ Adobe Type Set Value Pack—Offers Windows & OS/2 users 30 popular, scalable typefaces for documents of all kinds. Also includes Adobe Type Manager for that smooth, crisp type at any size..... **\$39.**

Delrina Technology ... NCP	
2446	▣ WinFaxPro 2.0..... 75.
5974	▣ DOSFax PRO 2.0..... 49.
7351	▣ PerFORM PRO Plus..... 239.
Digital Research ... NCP	
8288	▣ DR DOS 6.0..... 87.
ExperVision ... NCP	
7494	▣ TypeReader 1.01 Windows (\$100 rebate) 499.
8403	▣ TypeReader Competitive Upgrade.... 149.
Fifth Generation Systems ... NCP	
7725	▣ Direct Access 5.1..... 64.
3950	▣ Fastback Plus 3.1..... 119.
6431	▣ Fastback Plus 1.0 for Windows..... 119.
Fox Software ... NCP	
6188	▣ FoxPro 2.0..... 479.
Frame Technology ... CP	
6585	▣ FrameMaker for Windows..... 589.
Gibson Research ... NCP	
9832	▣ SpinRite II 2.0..... 64.
Hayes ... NCP	
7983	▣ Smartcom EXEC 2.1..... 75.
Helix Software ... NCP	
9627	▣ Netroom 2.1..... 52.
Hewlett-Packard ... NCP	
8101	▣ NewWave 4.0..... 109.
IBM ... NCP	
2666	▣ DOS 5.0 Upgrade..... 59.
7303	▣ OS/2 2.0 Upgrade from DOS..... 99.
ICOM Simulations ... NCP	
1326	▣ Intermission 3.0 for Windows..... 29.
5696	▣ Squeegie 1.0 for Windows..... 42.
Individual Software ... NCP	
6222	▣ Resume Maker 1.3..... 29.



ExperVision ... NCP

7494 ▣ TypeReader 1.01 for Windows—Quickly, easily, and accurately converts the printed page into electronic format, even retaining document formatting such as tables, columns, tabs, type styles, and sizes..... **\$499.**

airline fares!



Corel Systems ... NCP

5506 ☐ CorelDRAW! 3.0 —Adds graphic design layers, editable preview, improved 3D, charting, painting and photo editing, presentation tools and CD-ROM \$395.
2618 CorelDRAW! 3.0 (CD-ROM only) . 369.

Inset Systems ... NCP	
7298 ☐ HiJaak 2.1	139.
3820 ☐ HiJaak 1.0 for Windows	139.
7300 ☐ Inset Plus HiJaak	165.
Intuit ... NCP	
2426 ☐ Quicken 5.0	45.
5596 ☐ Quicken 1.0 for Windows	45.
6158 ☐ QuickBooks 1.0	89.
LaserTools ... NCP	
5852 ☐ PrintCache 3.0	99.
Light Source ... NCP	
7415 ☐ Ofofo for Windows	269.
Lotus ... NCP	
5417 ☐ 1-2-3 3.1 Plus	399.
5653 ☐ 1-2-3 2.4	335.
1852 ☐ 1-2-3 2.4 Upgrade	99.
2755 ☐ 1-2-3 1.1 for Windows	399.
5799 ☐ Ami Pro 3.0	249.
1847 ☐ Ami Pro Competitive Upgrade	95.
7812 ☐ LotusWorks 3.0	95.
3523 ☐ Freelance 1.0 for Windows	349.
5981 ☐ SmartSuite (Ami Pro, Freelance, and 1-2-3 for Windows)	469.
2748 ☐ cc:Mail Windows Platform Pack	325.
M-USA Business Systems ... NCP	
3408 ☐ Pacioli 2000 2.0 (Accounting software)	32.



Inset Systems ... NCP

5502 ☐ HiJaak 2.1 for Windows —Enhances & prints graphics images. Converts 23 raster, 15 vector, & 24 fax card formats. Captures graphics screens from Windows & graphics & text screens from DOS applications \$139.

MECA ... NCP

4880 ☐ One-Write Plus Accounting Works 3.0	\$119.
2798 ☐ Managing Your Money 8.0	49.
Microcom ... NCP	
6958 ☐ CarbonCopy Plus Upgrade	45.
6234 ☐ CarbonCopy Plus 6.0	119.
4410 ☐ CarbonCopy Plus for Windows	119.
Micrografx ... NCP	
3627 ☐ Windows Draw! 3.0	85.
8162 ☐ ABC Flowchart 1.1	189.
Micro Logic Software ... NCP	
8579 ☐ MoreFonts 3.0	75.
Microsoft ... NCP	
3338 ☐ Money 1.0 for Windows	45.
7010 ☐ Windows 3.1	89.
7388 ☐ Project 3.0 for Windows	445.
2904 ☐ Works 2.0	95.
2735 ☐ Works 1.0 for Windows	129.
3337 ☐ Publisher 1.0 for Windows	129.
7387 ☐ PowerPoint 2.0 for Windows	299.
6195 ☐ Word 2.0 for Windows	299.
2856 ☐ Excel 4.0 for Windows	299.
8137 ☐ Office 2.5 for Windows	479.
1620 ☐ MS-DOS 5 Upgrade	59.
6188 ☐ FoxPro 2.0	479.
1624 ☐ Visual Basic 1.0	129.



Lotus ... NCP

5799 ☐ Ami Pro 3.0 —Create professional looking documents faster and easier than ever. Includes new direct access features, including Fast Format, SmartIcon sets, Drag & Drop, and SmartClick..... \$249.

Niles & Associates ... NCP	
3880 ☐ EndNote Plus 1.0	149.
Nolo Press ... NCP	
2982 ☐ WillMaker 4.0	39.
Norton-Lambert ... NCP	
2753 ☐ Close-Up for Windows & DOS Dual Pack	129.
Novell ... NCP	
4000 ☐ Netware Lite 1.0	69.
Panacea ... NCP	
2413 ☐ WinSpeed 1.0 (Windows accelerator)	55.
PC Globe ... NCP	
5900 ☐ PC USA 2.0	29.
5902 ☐ PC Globe 5.0	39.
PC-Kwik ... NCP	
4925 ☐ PC-Kwik Power Pak 2.1 w/Power Disk	79.

800-800-0004



PC Connection
6 Mill Street
Marlow, NH 03456

SALES 603-446-0004 FAX 603-446-7791



Microsoft ... NCP

6188 ☐ FoxPro 2.0 —Delivers unparalleled database speed & performance. Includes a sophisticated programming environment & dBase compatibility. Receive a free upgrade to FoxPro 2.5 for DOS or Windows. \$479.

Peachtree ... NCP	
5757 ☐ Accounting for Windows	79.
Personics ... NCP	
9288 ☐ Laptop Ultravision 2.1 (3 1/2" only)	59.
4384 ☐ Desktop Ultravision	59.
Polaris Software ... NCP	
4395 ☐ PackRat 4.1	249.
PowerUp! ... NCP	
7860 ☐ Calendar Creator Plus 4.0	52.
Qualitas ... NCP	
7539 ☐ 386MAX 6.0	59.
7967 ☐ BlueMAX 6.0 for PS/2 (3 1/2" only)	79.
Quarterdeck ... NCP	
3221 ☐ Expanded Memory Mgr. 386 6.0	59.
6589 ☐ DESQview/X 1.0	169.
QUE Software ... NCP	
3091 ☐ RightWriter 5.0 for Windows	55.
Reality Technologies ... NCP	
6572 ☐ WealthBuilder 1.1	95.
Reference Software ... NCP	
4396 ☐ Grammatik V 1.0	55.
7483 ☐ Grammatik V 3.0 for Windows	55.
Sitka ... NCP	
6441 ☐ 10NET 2 - Node Network Starter Pak	FREE
6440 ☐ 10NET 3 - Node Network Expander ..	189.
Software Publishing ... NCP	
3482 ☐ Harvard Graphics 3.0	399.
4403 ☐ Harvard Graphics 1.0 for Windows	369.
Stac Electronics ... NCP	
1409 ☐ Stacker 2.0	85.
3524 ☐ Stacker 2.0 w/16-bit Coprocessor Card ..	185.
Stairway Software ... NCP	
6430 ☐ Screen Extender 2.0 for WordPerfect 5.0/5.1 ..	59.
Symantec ... NCP	
3784 ☐ The Norton Backup 2.0 for Windows ..	99.
3146 ☐ The Norton Utilities 6.0	115.
7999 ☐ Norton Anti-Virus 2.0	84.
2359 ☐ The Norton Desktop 2.0 for Windows ..	115.
8378 ☐ Norton PC Anywhere 4.5	119.
3425 ☐ Symantec Small Business Bundle	249.
3-D Visions ... NCP	
6210 ☐ Stanford Graphics 1.0 for Windows ..	299.
Teleware ... NCP	
9847 ☐ M.Y.O.B. for Windows	139.
TIMESLIPS ... NCP	
5037 ☐ TimeSheet Pro for Windows	135.
5698 ☐ Timeslips Release 5	189.
Timeworks ... NCP	
6253 ☐ Publish-It! 2.0	85.
T/Maker ... NCP	
6027 ☐ Fax Mania DOS or 7911 Windows ea.	27.

PC CONNECTION®

Just \$5 ships your



Application Techniques ... NCP

5557 **WinDings 1.0 for Windows**—Handy, inexpensive, and easy-to-use. WinDings for Windows solves many of your day-to-day information problems \$49.

Tool Technology ... NCP

- 3863 **WinTools 1.0 for Windows (3 1/2" only)** 119
Touchstone Software ... NCP
 7420 **Check It Plus 3.0** 85.
Traveling Software ... NCP
 4407 **LapLink Pro 4.0** 99.
WordPerfect Corporation ... NCP
 3804 **WordPerfect 5.1** 269.
 3494 **WordPerfect 5.1 for Windows** 279
XTree. ... NCP
 8328 **XTree 1.0 for Windows** 39
 6161 **XTree Gold 2.5** 95.

RECREATIONAL/EDUCATIONAL

Abracadata ... NCP

- 3629 **Design Your Own Home-Architecture 3.0** 32.
 3641 **Design Your Own Railroad 1.2** 39.

Buena Vista Software ... NCP

- 8351 **Heaven and Earth** 29.
Broderbund ... CP

- 3340 **Kid Pix** 35.
 5851 **SimCity from Maxis** 29.
 4411 **SimEarth for Windows from Maxis** 45

Davidson & Associates ... NCP

- 4183 **KidWorks** 29.
HyperGlot Software ... NCP

- (French, German, Italian, Spanish available.)
 Word Torture for Windows ea. 34
 Word Torture 3.0 ea. 29.

Knowledge Adventure ... NCP

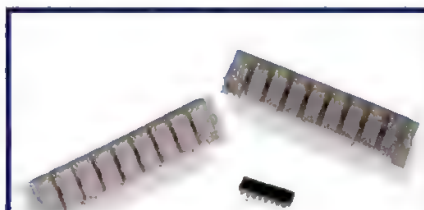
- 6456 **Isaac Asimov's Science Adventure** 49.
 8163 **Knowledge Adventure 1.0 (VGA ver.)** 49.



Buena Vista Software ... NCP

8351 **Heaven and Earth**—Enjoy 4 spell-binding entertainment experiences in one. Animated cards, illusions, pendulums, and a pilgrimage all bring you to a fuller experience than the usual game, puzzle or toy \$29.

- Microsoft ... NCP**
 2858 **Flight Simulator 4.0** \$39.
Penton Overseas ... NCP
 @VocabuLearn/ce Levels I & II (French, Italian, German, Spanish, Russian, Hebrew and Japanese) ea. 35.
Personal Training Systems ... NCP
 Training tutorials-beg. to adv. for Windows, Excel, PageMaker WordPerfect, Ami Pro, Microsoft Word & Lotus 1-2-3 (3 1/2") ea. 65
Sierra On-Line ... CP
 2767 **Leisure Suit Larry 5** 39.
 5150 **Aces of the Pacific** 45.
 3193 **Police Quest 3** 45.
Software Marketing Corp. ... NCP
 5145 **Bodyworks 1.0** 45.
Software Toolworks ... NCP
 4534 **Mavis Beacon Teaches Typing 2.0 (CP)** 31.
 3031 **Mavis Beacon for Windows** 39
 3023 **ChessMaster 3000** 35.
 3032 **ChessMaster 3000 for Windows** 39.
 5032 **Miracle (piano teacher) (incl. kybd.)** 325.
Toyogo ... NCP
 5138 **Go Master Deluxe 5.0 for Windows** 99.
 5143 **Go Master Deluxe 5.0** 99.
Walt Disney Computer Software ... NCP
 2629 **Mickey's 123's** 29.
 2624 **Mickey's ABC's** 29.
 9984 **The Animation Studio** 79.
 4416 **Sound Source** 29.



Memory ... 1 year

Bring out the power of Windows or any number of applications by boosting your memory.

- 5110 **1 MB x 9 SIMMs (80 ns)** \$45.
 2497 **4 MB x 9 SIMMs (80 ns)** 159.
 5746 **1 MB Chips (80 ns, set of 9)** 45.

HARDWARE

Warranties listed next to manufacturer.

- 3 Com ... lifetime (conditional)**
 3453 **EtherLink II/16** 159.
 3469 **EtherLink II/16 TP** 169.
American Power ... 2 years
 7108 **Smart UPS 400** 339.
 7105 **Smart UPS 600** 439.
 3819 **Back-UPS 250** 115.
 3858 **Back-UPS 400** 179.
 7107 **Back-UPS 450** 215.
 3823 **Back-UPS 600** 295.
Appoint ... limited lifetime
 2469 **Thumbelina PC** 62.
 2480 **MousePen Pro PC** 62.
ATI Technologies ... 2 years
 9821 **VGA Basic-16 (640 x 480, 16 colors)** 65.
 9985 **VGA Integra (1024 x 768, 16 colors)** 84.
 2706 **VGA Wonder XL24 (with 1 MB)** 149.
 2382 **Graphics Vantage VGA (with 1 MB)** 225.
 9822 **8514/Ultra (with 1 MB) (requires VGA)** 399.
 2012 **Graphics Ultra with VGA (with 1 MB)** ... 479.
 3902 **Stereo•F/X (sound board)** 109.
 3900 **VGA Stereo •F/X (w/512K, upgrd. to 1 MB)** 215.



Canon ... 1 year

7894 **BJ-10ex Printer**—New enhanced version of the popular 4.6 lb. printer provides laser-like print quality (up to 360 dpi) on plain bond paper, envelopes or transparencies. Available in white or gray \$329.

Boca Research ... 5 years

- 7150 **BOCARAM/AT PLUS (2 MB)** 189.
 7139 **(4 MB)** 279. **7138 (8 MB)** 459.
 8398 **External 14,400 Baud V.32 FaxModem** 275.
 8397 **Internal 14,400 Baud V.32 FaxModem** 219.
 6998 **I/O Board for AT** 49.
 6999 **I/O Board for Microchannel (S/S/P)** 89.
 8380 **BasicVGA (256K, 640 x 480)** 49.
 8381 **SuperVGA (1 MB, 1024 x 768)** 115.

Bravo Communications ... 2 years

- 7400 **2 Position Laser Compatible Switch Box** 109.
 7501 **CPS1021 (electronic switch box)** 135.

Brown-Wagh ... 1 year

- 8578 **Creative Labs Sound Blaster** 109.
 2336 **Creative Labs Sound Blaster Pro** 189.

Caere ... 1 year

- 8158 **Typist Plus Graphics** 389.

Canon ... 1 year

We are an authorized Canon Service Center.

- 7894 **BJ-10ex Printer (4.6 lb.)** 329.
 6679 **BJ-20 Printer (includes sheet feeder)** 429.
 7897 **BubbleJet Ink Cartridge (BJ-10ex)** 23.
 7896 **BJ-10ex Sheet Feeder** 75.

Cardinal ... 1 year

- 2719 **MB2296SR Internal 9600 FaxModem** 95.
 1197 **386-SX-25 Motherboard OK** 239.
 1480 **Cardinal 9600 Internal Modem** 239.
 2783 **Cardinal 9600 External Modem** 265.

Chips & Technologies ... lifetime

- 6137 **SuperMath 387DX-25** 81.
 6138 **SuperMath 387DX-33** 85.
 6126 **SuperMath 387SX-25** 69.

CoStar ... 1 year

- 1947 **LabelWriter II** 185.

COVOX ... 1 year

- 5543 **Sound Master II** 145.

Curtis ... lifetime

- 1708 **Ruby-Plus SPF-2+** 59.
 7358 **Command Center SPF-4** 79.

Cyril Corporation ... 5 years

MATH COPROCESSORS

- 9875 **FasMath 83D87-25** 97.
 9876 **FasMath 83D87-33** 97.
 9877 **FasMath 83S87-16 (SX compatible)** 76.

Diamond Computer ... 5 years

- 6945 **Stealth Hi-Color** 239.

Epson ... 2 years

We are an authorized Epson Service Center

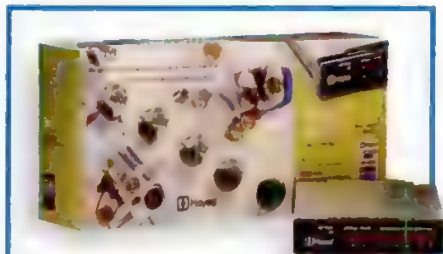
- AP-3250 (80 col., 200 cps, 24 pin) 239.
 1906 **FX-850 (80 col., 264 cps, 9 pin)** 319.
 1904 **FX-1050 (136 col., 264 cps, 9 pin)** 449.
 2358 **LQ-570 (80 col., 252 cps)** 289.
 2361 **LQ-870 (80 col., 330 cps)** 489.
 2357 **LQ-1170 (136 col., 330 cps)** 669.
 5184 **LX-810 (80 col., 180 cps, 9 pin)** 185.

Hauptpaage Computer ... 1 year

- 3670 **33 MHz 486N Motherboard for AT (1 MB)** 1229.

- 4008 **Win/TV** 439.

order overnight.



Hayes ... 2 years

8187 OPTIMA 24+ FAX 96—Affordable V.22bis 2400 bps data and Group 3/9600 bps FAX Modem. V.42 V.42bis. MNP 5, plus 2400, 1200, and 800 bps. Free Smartcom data and FAX software \$159.

Hayes ... 2 years

7391	ULTRA 96 Modem.....	669.
5024	ULTRA 144 Modem.....	799.
1345	OPTIMA 24 Modem.....	155.
3522	OPTIMA 96 Modem.....	389.
8187	OPTIMA 24+ FAX 96.....	159.
7395	OPTIMA 144+ FAX 144.....	479.
9884	Pocket Edition 2400.....	119.

Hewlett-Packard ... 1 year

3175	DeskJet 500C (color) (with toner).....	749.
3957	LaserJet IIP Plus (with toner).....	879.
9993	LaserJet IIIP (with toner).....	1099.
6754	LaserJet III (with toner).....	1599.

Intel ... 3 years

3864	14.4EX Modem.....	469.
1086	Matched Memory Classic Memory Brd. Ok	139.
5990	SatisFAXtion Model 100.....	99.
5992	SatisFAXtion Model 200.....	299.
5994	SatisFAXtion Model 400.....	399.
5995	SatisFAXtion Model 400E.....	449.
5999	EFAXability Plus (software).....	79.
6003	EFAXability Plus OCR (software).....	165.
2994	EtherExpress 16.....	129.
3021	EtherExpress 16 TP.....	129.
6413	OverDrive Processor (for 486SX-20 MHz).....	459.
6418	OverDrive Processor (for 486SX-25 MHz).....	579.
6251	NetPort II.....	499.

MATH COPROCESSORS

4750	80387SX (all 80386SX CPU's).....	79.
5409	80387DX (all 80387DX CPU's).....	85.

Kensington Microware ... 1 year

Full line available. Partial listing.

4973	PowerTree 20 (6 outlets, EMI/RFI Filtering).....	24.
2582	Master Piece Plus 95. 2587 Remote.....	105.
7899	Expert Mouse serial... 99. 7900 bus.....	115.
3311	MasterStand.....	59.
3312	LaserStand (for HP LaserJet).....	125.

Keytronic ... 3 years

4518	101 Plus Keyboard.....	99.
------	------------------------	-----

Logitech ... limited lifetime

3996	Trackman2 (combo).....	84.
2343	Trackman Portable.....	99.
7975	ScanMan 256.....	269.
3295	MouseMan (combo) 69. 9766 (cordless).....	89.

MediaVision ... 3 years

5638	MultiMedia PC Upgrade Kit 16.....	969.
5641	ProAudio Spectrum Plus.....	185.
5637	ProAudio Spectrum 16.....	219.

Megahertz ... 5 years

6576	P296FMV Fax Modem (9600 baud V.42).....	479.
1187	T324FM 96/24 Fax Modem (Toshiba Lpts.).....	269.

Microsoft ... lifetime

7597	Microsoft Mouse (bus or serial).....	\$85.
2898	Mouse with Windows 3.0 (bus or serial).....	149.
1896	Ballpoint Mouse (serial only).....	119.

MicroSpeed ... 1 year

2763	MicroTRAC (serial & PS/2 interface).....	57.
6330	PC-TRAC Trackball (PS/2).....	75.
6007	PC-TRAC Trackball serial.....	75.

Microtek ... 1 year

2736	ScanMaker 600G (gray-scale scanner).....	759.
2739	ScanMaker 600Z (color scanner).....	1249.

Mouse Systems ... lifetime

3213	PC Trackball II (serial).....	55.
7878	PC Mouse III (serial).....	69.
5613	Little Mouse/PC (serial).....	65.
5979	NewPoint.....	79.

NEC ... 2 years

4252	MultiSync 3FGX Monitor (14").....	689.
4249	MultiSync 4FG Monitor (15").....	799.
3151	MultiSync 5FG Monitor (17").....	1449.
5377	SilentWriter Model 95 PostScript Laser.....	1439.

Okidata ... 1 year

We are an authorized Okidata Service Center.

5093	OL400 Page Printer (4 ppm).....	649.
5094	OL830 Page Printer (8 ppm).....	1299.
3025	Toner Cartridge.....	25.



IBM ... NCP

7303 □ OS/2 2.0 Upgrade—Upgrade to OS/2 2.0 from DOS (any version). Full fledged operating system that runs DOS, Windows, and OS/2 applications. 386SX PC's and above \$99.

Orchid Technologies ... 4 years

7863	ProDesigner VGA IIS (with 1 MB, includes RAMDAC chip).....	189.
------	--	------

4071	Fahrenheit 1280i with 1 MB.....	299.
------	---------------------------------	------

Pacific Data ... lifetime/60 day MBG

5072	25 Cartridges in One! (for DeskJet 500).....	105.
6779	25 Cartridges in One! (LJ II, IID, IIP, III, IIID).....	269.

Memory upgrade for LJ IIP, III, IIID, IIIP:

7055	2 MB.....	119.
	7759 4 MB.....	199.
	Memory upgrade for LaserJet II/IID:	
6838	2 MB.....	145.
6836	4 MB.....	259.
7158	Pacific Page PE (LJ IID, IIP, III, IIID, IIIP).....	299.
9633	Pacific Page XL (w/accelerator board).....	699.
3388	Pacific Page PE w/ 2 MB (LJ IIP, III).....	399.
5729	ProTracer (personal CAD printer) (1 yr.).....	1099.

800-800-0004



PC Connection

6 Mill Street

Marlow, NH 03456

SALES 603-446-0004 FAX 603-446-7791



Practical Peripherals ... lifetime

2425 PM14400FXSA Modem/Fax—Get ultra high speed 14,400 bps data transmission as well as Group III S/R fax capabilities in one integrated and affordable package. Includes QuickLink II for modem and fax communications \$399.

PC Power & Cooling ... 2 years

3203	Turbo Cool 200 (power supply).....	149.
7915	Turbo Cool 300 (power supply).....	159.

Practical Peripherals ... lifetime

3103	PM2400 Modem (internal).....	79.
3102	PM2400 Modem (external).....	99.
8993	PM2400 Modem (internal, V.42bis).....	115.
8994	PM2400 Modem (external, V.42bis).....	125.
8132	PM2400 Pocket Modem.....	109.
2266	PM9600 Internal Modem.....	275.
7934	PM9600SA Modem.....	289.
2264	PM2400FX96 (int. modem/fax).....	95.
1344	PM2400FX96SA (ext. modem/fax).....	99.
3803	PM14400FX96 (int. modem/fax).....	359.
2425	PM14400FXSA (ext. modem/fax).....	399.

Prometheus ... 2 years

1222	ProModem Ultima Home Office.....	489.
------	----------------------------------	------

PSION ... 1 year

6449	Series 3 Palmtop (256K).....	379.
------	------------------------------	------

Solectek ... 1 year

4804	Pocket Fax Windows.....	219.
4769	Pocket LAN Ethernet.....	299.

Standard Microsystems ... 5 years

6376	Ethercard Plus Elite 16.....	139.
6372	Ethercard Plus Elite 16 (6 Pack).....	759.
6370	Ethercard Plus Elite 16T.....	165.



Hewlett-Packard ... 1 year

9993 LaserJet IIIP (with toner)—Superior speed and built-in typefaces with PCL 5 language makes this laser printer a stand out \$1099.

PC CONNECTION

Any size or weight.

Targus ... lifetime	
1305	Universal Notebook (computer case) ... \$69.
Technology Concepts ... 2 years	
6315	Fax Line Manager 203 139.
6009	Omnilink Laser 425.
TheComplete PC ... 2 years	
6069	TheComplete Modem Plus 95.
5828	TheComplete Communicator 299.
Tripp Lite ... 2 years	
6199	Isobar 4-6 (4 outlets, Gold Seal Warranty) 49.
6200	Isobar 6-6 (6 outlets, Gold Seal Warranty) 59.
6506	BC1250 LAN Power Backup 499.
Video 7 ... 7 years	
9768	VRAM II VGA 1 MB 329.
Zoom Telephonics ... 7 years	
1307	Int. 2400 Baud w/9600 Baud Fax Modem 99.
1178	Ext. 2400 Baud w/9600 Baud Fax Modem 99.
1181	2400 Baud V.42bis Modem (2 year) 115.
3574	Ext. 2400 Baud V.42/9600 Baud Fax ... 145.
3386	FaxModem AFC (2400 baud 96S/48R) .. 69.
4430	FaxModem AFX (2400 baud 96S/48R) .. 79.
4429	FaxModem V.32bis 9600 baud (internal) 259.
4428	FaxModem V.32bis 9600 baud (external) 289.
7921	Pocket FaxModem 99.



Zoom Telephonics ... 7 years

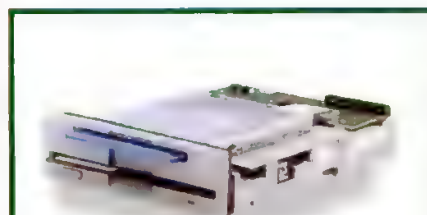
7921 Pocket FaxModem—Fax and data modem for portable computers. 9600 send, 4800 receive fax. 2400 bps data modem with V.42bis, MNP 5 using RPI. Power saving features \$99.

Quantum ... 2 years	
8304	Plus Hardcard II XL 50 MB (9 ms)..... \$225.
8287	Plus Hardcard II XL 105 MB (9 ms)..... 389.
4060	105 MB Drive Kit for MC PS/2's (13 ms) 639.
Summit Memory Systems ... 2 years	
6436	SE120 Tape Backup 215.
6438	SE250 Tape Backup 285.
TEAC ... 1 year	
6951	1.2 MB Drive for AT 65.
4670	1.44 MB Drive for PC/XT (3 1/2") 59.
4326	1.44 MB Drive for AT (3 1/2", w/Bastech) 75.
4951	720k Drive for PC/XT (3 1/2") 55.
4414	3 1/2" 5 1/4" Dual Floppy Drive 145.



AddStor ... NCP

4090 SuperStor 2.0—Double your disk capacity with an advanced, featured rich software only data compression product. Easy to install and use. Compatible with Windows and all applications \$79.



TEAC ... 1 year

4414 3 1/2" 5 1/4" Dual Floppy Drive—Get two drives in one. TEAC's new Dual Floppy Disk Drive gives you both 3 1/2" and 5 1/4" in one, saving you space and money... \$145.

3298	3 1/2" HD Disks (10) .. \$15.	6375 (30) .. \$42.
8185	QD2040 14.	1895 QD2120 21.
Toshiba ... lifetime		
4858	3 1/2" 2.88 MB ED Disks (Qty. 5)	00.
9755	3 1/2" 2.88 MB ED Disks (Qty. 10)	00.

OUR POLICY

- We accept VISA and MASTERCARD.
- No surcharge added for credit card orders.
- Your card is not charged until we ship.
- If we must ship a partial order, we never charge freight on the shipment(s) that complete the order (in the U.S.).
- No sales tax, except Ohio residents (please add applicable tax).
- All U.S. shipments insured; no additional charge.
- APO/FPO orders shipped 1st Class Mail.
- International orders U.S. \$100 minimum. Manufacturer support and upgrade eligibility may be limited outside the U.S.A.
- Upon receipt and approval, personal and company checks clear the same day for immediate shipment of your order.
- Corporate P.O.s accepted subject to approval.
- COD max. \$1000. Cash or cashier's check.
- 120 day limited warranty on all products. Defective software replaced immediately. Defective hardware repaired or replaced at our discretion. All items subject to availability. Prices and promotions subject to change without notice.
- To order, call us Monday through Friday 8:00 a.m. to 3:00 a.m., or Saturday 9:00 a.m. through noon on Sunday Eastern Time. You can call our business offices at 603-446-3383 Monday through Friday 9:00 a.m. to 5:30 p.m.



IOMEGA ... 1 year

6343 PC Powered 90—Lowest priced Bernoulli drive ever in one complete, convenient package. Includes 90 MB cartridge, PC2B interface card, and cable..... \$499.
6344 PC Powered 90 PRO 599.

DRIVES

Colorado Memory Systems ... 1 year	
4194	Jumbo 120 Tape Backup 199.
4354	Jumbo 250 Tape Backup 269.
Conner Peripherals ... 1 year	
2339	CP30104H 120 MB IDE HD (19 ms).... 399.
1337	CP3204 200 MB IDE HD (16 ms)..... 599.
IOMEGA ... 1 year	
<i>We are an authorized Iomega Service Center.</i>	
6499	Transportable 90 PRO 679.
6501	Dual 90 PRO 1479.
6502	Insider 90 PRO 579.
6343	PC Powered 90 (incl. PC2B & cart.)..... 499.
6344	PC Powered 90 PRO (incl. PC2B, cartridge & Central Point Software)..... 599.
2500	PC2B-2 Controller 149.
2530	90 MB Cartridge 149.
2467	90 MB Cartridge Tripak 439.
Mountain Network Solutions ... 2 years	
3812	FS8500 IDE Tape Backup (304 M) 499.
6153	DC2120 Tape Cartridge (5 pack) 149.
NEC ... 2 years	
7020	Audio Upgrade Kit (internal) 399.
6577	CDR37 Portable CD-ROM Drive 399.
6582	CDR74 Portable CD-ROM Drive 589.
6581	CDR84 for PC/XT/AT 599.
7023	MPC Upgrade Kit (with CDR37) 949.
7021	MPC Upgrade Kit (with CDR84) 1079.
Pacific Rim ... 1 year	
1304	1.2 MB External (for any parallel port) .. 239.
2761	1.44EX MB Ext. (for any parallel port) .. 239.

MEMORY

6556	256k DRAMS (100 ns, set of 9) 19.
5510	1 MB x 9 SIMMs (80 nanosecond) 45.
2497	4 MB x 9 SIMMs (80 nanosecond) 159.
5746	1 MB Chips (80 ns, set of 9) 45.

DISKS/MEDIA

3M ... lifetime			
3943	DC2000.....	17.	1581 DC2120 23.
Fuji ... lifetime			
2214	3 1/2" DS Disks(10)	9.	2242 (50)..... 32.
2215	3 1/2" HD Disks(10) ..	15.	2241 (50)..... 59.
2239	3 1/2" HD Color Disks (Qty. 10).....		18.
2243	3 1/2" DS Color Disks (Qty. 10).....		10.
Sony ... lifetime			
3292	5 1/4" HD Disks(Qty. 10)		11.
3297	3 1/2" DS Disks (10)	9.	6148 (30).. 25.

SHIPPING

*Continental U.S.: The total freight charge on any order placed with PC Connection is only \$5. Barring events beyond our control, all credit card orders phoned in weekdays by 3:00 a.m. Eastern Time will ship Airborne Express for delivery the next business day. Which means same day delivery for orders placed between midnight and 3:00 a.m. Eastern Time. (Some orders may ship by UPS Ground for next day delivery). Saturday delivery available to many areas upon request at no additional charge. Order all day Saturday through noon on Sunday for Monday delivery. (Some areas require an additional day delivery).

Hawaii, Alaska, Canada, Puerto Rico and the U.S. Virgin Islands: Call 800-800-0004 for information on shipping and charges.

All other areas: Please call 603-446-0004 or FAX 603-446-7791 for information.



Benchmark Tests: VGA-to-NTSC Boards

Three boards with on-board VGA used a Tseng ET4000 chip. The Tseng ET3000-based Willow VGA-TV GE/O outperformed only the Cardinal SNAPplus. Each board's performance is tied to the Windows drivers the companies suggested we use.

MEMORY-TO-SCREEN BitBlt

LINE DRAWS

Pixels per second except where indicated	MEMORY-TO-SCREEN BitBlt					LINE DRAWS							Graphics Winmark (Megapixels per second)
	Source Copy	Pattern Copy	Pattern Invert	Destination Invert	Whiteness	Single Horizontal	Single Vertical	Single Diagonal	Poly Horizontal	Poly Vertical	Poly Diagonal	Random Rectangles	
* ATI VGAWonder Plus	2,682,923	2,386,377	1,246,888	1,344,619	2,856,407	1,431,407	849,110	277,675	2,954,769	855,424	312,013	2,691,144	1.92
Cardinal SNAPplus	1,086,334	1,069,194	535,678	570,054	1,118,448	349,175	424,495	182,553	400,186	327,608	198,770	1,079,161	0.74
Everex Vision VGA with Overlay	2,968,937	2,303,986	1,037,066	1,171,257	3,106,849	344,768	433,559	184,051	404,061	324,626	201,908	2,594,481	1.48
Truevision VideoVGA	2,871,588	2,324,678	1,019,704	1,159,848	3,166,334	340,587	434,500	184,299	401,095	323,614	201,752	2,582,011	1.47
Willow VGA-TV GE/O	1,289,129	1,187,849	577,414	636,511	1,324,298	345,840	432,312	179,125	402,330	322,364	193,902	1,271,150	0.83

* Reported for comparison. We tested the products at 640-by-480 resolution with 256 simultaneous colors, using the Windows driver suggested by each manufacturer.

HOW WE TESTED

To test the performance of the VGA-to-NTSC products that provided on-board VGA, we used WINBENCH 2.5 to obtain the Graphics Winmark scores. Our test-bed in this case was a Compaq Deskpro 386/25e with a 310MB hard disk and 8MB of memory. A larger Winmark score represents better performance.

With the release of Version 2.5 of PC Labs' WINBENCH tests (our graphics performance tests for Microsoft Windows), PC Labs has introduced a new method of measuring graphics performance. The **Graphics Winmark** is the geometric mean of 12 WINBENCH graphics tests, measured in millions of pixels per second. PC Labs profiled the major Windows applications in November 1991 and determined which graphics functions are most frequently used within Windows. The Winmark takes into account 12 tests of these key functions and weights them to reflect how frequently the functions are used. Windows applications also use other graphics functions, but far less often.

As a group, the tests that compose the **Memory-to-Screen BitBlt ROPs** (raster operations) portion of the WINBENCH tests move a rectangular bitmapped image from system memory to screen memory. Memory-to-Screen BitBlt ROPs predominate in Windows for both text-intensive and graphics-intensive applications.

BitBlt always use a source, pattern, and destination. System memory is the source and the screen memory is the destination. The pattern bitmap on our tests was an image of the *PC Magazine* logo. Windows and Windows applications use BitBlt ROPs to achieve many of the common effects that you see on the screen: displaying the background bitmap, clearing the screen, moving an entire window from place to place, and highlighting an icon, to name a few. WINBENCH performs its BitBlt ROPs with 64-by-64-pixel bitmaps. Here is the operation that each individual BitBlt ROP score measures:

Source Copy simply moves the source bitmap from system memory to screen memory.

Pattern Copy moves the pattern bitmap from system memory to screen memory.

Pattern Invert inverts the pattern bitmap and puts the resulting image on the screen.

Destination Invert inverts the destination bitmap and puts the resulting image on the screen.

Whiteness changes all the bits in the destination image to the current background color.

As a group, the tests that compose the **Line Drawing** suite measure the graphics boards' ability to draw straight lines. Microsoft Windows has two ways to draw straight lines: It can simply draw a single straight line

from one point on the screen to another, or it can draw polylines, a series of lines that are connected end-to-end. Conceptually, polyline drawing is very much like a connect-the-dots puzzle. Windows draws polylines faster than it does a corresponding series of single straight lines, so applications use polylines whenever possible.

Line drawing is used for borders around Windows and for many other lines that you see on the screen. The **Single Horizontal**, **Single Vertical**, **Single Diagonal**, **Poly Horizontal**, **Poly Vertical**, and **Poly Diagonal** tests draw horizontal, vertical, and diagonal straight lines to show the differences in hardware- and software-based line-drawing capabilities for various graphics adapters.

Random Rectangles

The **Random Rectangles** test draws and fills rectangles using a repeatable sequence of randomly chosen *x* and *y* coordinates, colors, and patterns. Windows draws and fills rectangles with various patterns; the program uses patterned rectangle drawing to fill in many areas on the screen. In particular, Windows chooses patterns to fill areas with dithered colors, which is necessary to represent color shadings when a graphics adapter is capable of displaying only a limited number of colors.

as the Magni and the Truevision, exhibit fairly low and flat results across all frequencies, indicating a crisp video image. The 2.0-MHz level, the highest level attainable by most consumer VCRs, however, shows substantial NTSC signal loss for the Genoa (-16.75 dB). The Everex, at -3.82 dB, was the second-poorest performer on this test. Super VHS, Hi-8, and other formats can attain higher levels

than most consumer VCRs. If you plan to use any of those formats, you won't want to settle for a board that does well at 2.0 MHz and lower frequencies, but has poor high-frequency response.

MASTER THE POSSIBILITIES

Given the eccentricities of working with video, the most important rule to follow to get the highest-quality output possible

is to use the highest-quality video technology. Unlike digital media, in which a 1 is a 1 is a 1, analog recording media degrades with every generation. The noise introduced with each encoding and decoding of the video accumulates, so the quality of the video on your end product is already at least one generation degraded from your original. This means using, where possible, professional quality

**AT \$1995 FOR
A 486 NOTEBOOK,
WE'RE JUST
WARMING UP.**



Systems Include:†

- 4MB RAM expandable to 32MB
- 105MB IDE, 16ms drive
- 1.44MB, 3.5" drive
- 1.2MB, 5.25" drive
- 16-bit SVGA, 1MB
- Super VGA color monitor (1024 x 768 resolution)
- 1 parallel/2 serial ports
- 5 expansion slots
- Upgradable processor
- Turbo button and key lock
- 200 Watt power supply
- 101-key enhanced keyboard
- Serial mouse
- MS Windows™ 3.1 and MS-DOS® 5 pre-loaded
- MS WORKS™ for Windows

† Specifications for all Leader systems except 486/25 which has 2MB RAM expandable to 16 MB, 16-bit SVGA, 512KB, 3 expansion slots, not upgradable

MULTIMEDIA, \$599.

Experience the hottest new trend in Multimedia Option with your factory install it free!

• High capacity internal CD-ROM drive
• stereo speakers with internal amplifier; (batteries not included)
• MS Works & Software Toolworks® Illustrated Holmes Interactive Game.



Leader system shown with optional multi-media package



For a limited time only you can receive MS WORKS free. MS WORKS includes a word processor, spreadsheet, and database management

craftsmanship, reliability and support you'd expect from a design-oriented company with nearly a decade of experience in the PC business.

Our low prices and 30-day, no-questions asked moneyback guarantee make Leader systems easy to buy. Our 100% parts and labor coverage and free on-site service for one year, unlimited toll-free phone and FAX technical support, and on-line bulletin board support make Leaders easy to keep. And our knowledgeable, friendly salespeople make us easy to like.

Don't just take our word for it.

Our obsession with total customer satisfaction led PC Computing to award PC Brand "a perfect 10 in performance", "a perfect 10 in price", and "the best service and support in its group" in its prestigious PCC 200 review in June, 1992.

The Leader Series from PC Brand. Get 'em while they're hot.

PC BRAND

1-800-PC-BRAND

OR 1-800-722-7263 FAX: 1-800-722-7392

The People's Choice.

Service on desktop and tower systems is available to most locations in the United States. • PC Brand reserves the right to change specifications without notice. • Call for additional leasing options. • Leasing available to qualified customers. • Moorpark, CA 93021

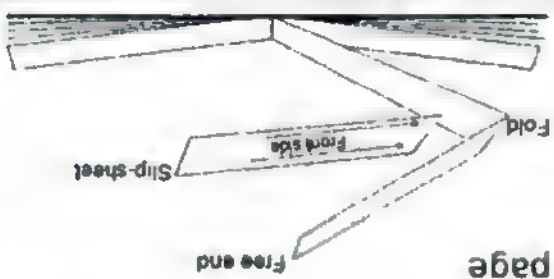
Foldout slip-sheet

1. Open the foldout page
2. Insert this sheet with
 1. Front side touching the free page
 2. Arrow pointing to the fold
3. Slice the folded edge
4. Close the page and slip-sheet

Folded edge of the page



Inverted Foldout slip-sheet

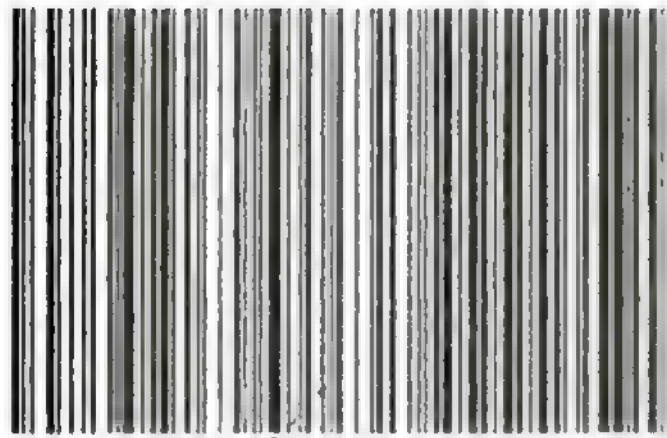


Folded edge of the page

1. Open the foldout page
2. Insert this sheet with
 1. Front side touching the free page
 2. Arrow pointing to the fold
3. Slice the folded edge
4. Close the page and slip-sheet

1. Follow instructions on the other side

Inverted Back



GbsSlipBack-0018

Back

1. Follow instructions on the other side

THE HEATWAVE CONTINUES.

THE LEADER SERIES:

DOLLAR FOR DOLLAR, MORE FEATURES,
MORE PERFORMANCE, MORE SATISFACTION.

\$1295 486/25

LEASE: \$50/MONTH

\$1495 386/40 Cache

LEASE: \$57/MONTH

\$1695 486/33 Cache

LEASE: \$60/MONTH

\$2195 486/DX2-50 Cache

LEASE: \$78/MONTH

\$2495 486/DX2-66 Cache

LEASE: \$95/MONTH

ALL THIS AND MUL

Everything you need to exp
in computing. Order the M
Leader Series, and we'l

- Sound Blaster Pro audio card from Cre
- ROM drive; MPC compliant • Top quality
- volume, bass & treble boost controls (l
- Bookshelf® for Windows Multimedi
- Encyclopedia • Sherlock F

While PC Brand 486 notebook prices are red hot, our Leader Series desktop values are positively scorching. That's because the PC Brand Leader systems give you more than 486 power at 386SX prices. They're also loaded with performance and convenience features that make them the very best value available, including 105MB hard drive (larger capacities available), high speed cache memory* and Super VGA color monitor.

Now low-price doesn't mean dead end.

Our competitors' so-called 'value' product lines cut costs by cutting corners in quality and expandability. And those all-important "extras" are just that - extra, if they're offered at all.

Fortunately, you'll find the attention to detail that PC Brand is famous for throughout the Leader Series. Five expansion slots, 4 solidly-built drive bays, upgradable processors and a serious, 200 watt power supply make Leaders the systems to grow with.* Windows 3.1 and DOS 5.0 are preloaded to make you more productive, more quickly. And for a limited time only you can get MS WORKS included free.

Leader systems mean quality throughout.

Leader systems are engineered, not just assembled, here in the USA. With the high quality



• Custom configurations available. • Major credit cards, checks, money orders, direct wire, and approved purchase orders accepted. • One-year 100% parts and labor warranty • Free one-year on-site service. • The right to amend specifications and prices without notification • All non-PC Brand products and services are identified by trademarks or other service marks of their respective companies. • Rates by businesses only • Tower systems also available • *4 expansion slots, no cache memory, or upgradable processor on Leader 486/25 • ** Landmark performance chart ©1992 PC Brand, 405 Science Dr.

It's 120 MEGABYTES IN THE SHADE

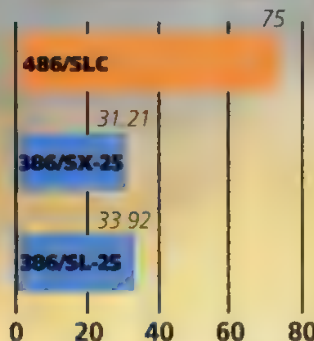
486/SLC, 120MB Notebook \$1995

LEASE: \$76/MONTH

Systems Include:

- 120MB IDE, drive
 - 486/SLC, 25MHz Processor
 - 2MB RAM expandable to 16MB
 - Internal 1.44MB, 3.5" drive
 - Paper white VGA, non-glare CCFT backlit 9" LCD screen
 - 640 x 480 resolution, 32 gray shades
 - Supports an external VGA monitor
 - Expansion bus connector
 - 1 parallel/2 serial ports
 - Power management features
 - NiCad battery and power adapter
 - Full-size keyboard, inverted "T" cursor key layout, 12 function keys
 - External port for keyboard or numeric keypad
 - MS-DOS 5 and MS Windows 3.1 pre-loaded
 - 8.66" x 11" x 2.08", 6.5 lb.
 - **Includes leather carrying case**
- 80MB IDE drive also available

Landmark V2.00 Performance Test



How hot is it? We're making the PC Brand 486/SLC notebook sizzle with a massive 120 Megabyte hard drive. While keeping the price at a very cool \$1995.

This 486 notebook's advanced technology features deliver state of the art convenience, as well as power. With 2-1/2 times the rated performance of the 386/SX-25*, our 486SLC processor provides impressive power, without consuming it.

The PC Brand 486/SLC is more powerful and more expandable than other leading notebooks. With memory upgradable to 16 MB (twice as much as the competition), optional modem or FAX/modem, and enough external ports to accommodate an external VGA monitor and keyboard / numeric keypad. And set up your notebook to suit any situation with options such as an automobile adapter, portable mouse, spare NiCad battery, and expansion chassis.

With all this and our 30-day moneyback guarantee, total support, and friendly assistance that PC Brand is famous for, you've got it made in the shade.

PC BRAND

1-800-PC-BRAND

OR 1-800-722-7263 FAX: 1-800-722-7392

In Mexico: 95-800-722-7263
Sales Hours: M-F 7am-9pm Sat 10am-4pm Central Time
FAX us anytime at the number listed for our latest quotes.

The People's Choice.

■ For Scan Conversion Only

by Tom Giebel

Sometimes all you need is the ability to display computer output on a television monitor or on videotape, plain and simple. Unlike the eight boards included in the main section of this roundup, the scan converters discussed in this sidebar are not able to overlay a computer display onto video input; they can only convert your computer's VGA signal for output to either an NTSC television or a videocassette recorder.

The devices we discuss here, which range in price from \$299 to \$1,799, will most likely be used for business presentations, training, or software demonstrations, but their use is limited only by your imagination. They can be part of a sophisticated teleconferencing system, or they can let you play computer games on a giant-screen TV. You can choose a unit that installs in your PC, or if you need to take it on the road, you can get one that plugs into an external device.

With two exceptions, these units lack both genlocking and overlay capabilities. The \$1,695 Genie, from Jovian Logic Corp. (Fremont, California; 510-651-4823), and the \$2,395 Mediator, from VideoLogic (Cambridge, Massachusetts; 617-494-0530), have genlocking abilities (they can sync video signals). But both require an additional video overlay board or video editing system (such as NewTek's Video Toaster) to perform VGA-on-video overlay.

One way to differentiate these units is by the method—hardware or software—that they use to convert the video signal from the VGA scan rate of 31.47 kHz to the 15.74-kHz scan rate used by television.

Products that use a hardware-based method process the VGA signal in parallel with the VGA card itself. This allows for simultaneous VGA and NTSC output on the PC and television monitors, respectively.

Devices using a software-based method rely on a TSR program to reduce the scan rate before the image is output. The drawback to this method is that a regular VGA monitor cannot display the resulting signal. Most of these units feature a software toggle that lets you switch between VGA and TV output. But if you want to view the computer screen and the TV monitor at the same time, you will need a multi-scanning PC monitor.

EXTERNAL: READY FOR TRAVEL

Most of the external units attach to your TV via an S-video connector and to your PC via the VGA connector. Ranging from the size of a cigarette pack to that of a notebook PC, these devices are all portable: ideal for on-the-road presentations, sales calls, or using the TV in your hotel room as a display.

Half of the external units use hardware to perform the VGA signal conversion, including the \$1,595 Coconut, from Communications Specialties (Hauppauge, New York; 516-273-0404); the Genie; the \$1,195 LaptopTV, from Willow Peripherals (Bronx, New York; 718-402-9500); the Mediator; and the \$495 SimulScan, from IEV International (Salt Lake City, Utah; 800-438-6161).

Three pocket-size units attach directly to a VGA port and use software to convert the VGA signal. These are the \$399 Model 701 Pocket Video-Verter, from Telebyte Technology (Greenlawn, New York; 516-423-3232); the \$300 TelevEyes, from Digital Vision (Dedham, Massachusetts; 617-329-5400); and the \$299 ProPC/TV, from Aitech International Corp. (Milpitas, California; 408-946-3291).

Two other external units that use software for the signal conversion are the \$625 123A, from Macro Data (Tempe, Arizona; 602-966-2221), and the \$395 VIN Plus, from Jovian Logic Corp.

INTERNAL: FOR THE DESKTOP

Three internal boards that perform the VGA conversion in hardware are the \$615 Vision VGA HC, from Everex Systems (Fremont, California; 510-683-2100); the \$595 VGA Video Gala, from High Res Technologies (Lewiston, New York; 416-497-6493); and the \$750 Tape Caster, from Redlake Corp. (Morgan Hill, California; 408-399-5000). The Tape Caster uses an external cable to connect to an existing VGA card. The VGA Video Gala has the added feature of video input and can display full-motion video in a window on a VGA monitor.

Two boards use software for the signal conversion: the \$1,799 Channel 4, from STB Systems (Richardson, Texas; 214-234-8750), and the \$495 VIGA-VGA, from Visionetics International (Torrance, California; 310-316-7940).

If you are setting up a VGA-to-NTSC system from scratch, look for a product with on-board VGA or Super VGA capabilities, such as the Channel 4, the VGA Video Gala, the VIGA-VGA, or the Vision VGA HC. If you are adding video output capabilities to an existing system, any of the other boards mentioned here will provide NTSC output at the resolution of your current VGA board.

Some applications require you to display computer output on several monitors simultaneously, such as closed-circuit TV systems or presentations to large audiences. The Channel 4 has four separate S-video output jacks; this internal board holds four VGA chips, each holding 512K, and produces 640-by-480 resolution with 256 simultaneous colors. Another multiport solution is the VIGA-VGA, which comes with on-board Super VGA and offers 1,024-by-768 resolution with 256 simultaneous colors. You can install up to 16 VIGA-VGA boards in a single PC (provided you can find a PC with enough slots). □

HARDWARE

VGA-to-NTSC Boards

equipment for the input video, and, at the very least, S-VHS (also called S-video) for recording. (There is some debate in the video industry as to whether S-VHS is really superior. If you have a tight budget, use Hi-8.)

If you need to genlock to a poor-quality input video source, look for a board that can accept a separate sync from a black-burst generator, which creates a reference wave. The only two boards that meet this criterion are the Everex and the Magni. To combine multiple input video sources, plan to spring for a couple of time-based correctors (units that make sure the signal's synchronization information is correct) and a video switcher (a device that lets you switch among several input video sources), as well. All this hardware ensures stability and compatibility among the various video signals.

For the low-budget videographer, the best solution is probably S-VHS. Rather than combining the chrominance and luminance signals into one composite wave, S-VHS splits them into two channels, Y and C, which minimizes the effects of crosstalk. Even though they get recombined in a composite monitor or consumer VHS system, the longer you can keep them apart, the less chance of degradation. S-VHS's 400 lines of horizontal resolution are almost twice VHS's 240 lines of horizontal resolution, and it has a slightly higher signal-to-noise ratio on average.

For more money, you can opt for Hi-8 (another Y/C component format), which has the highest resolution and luminance bandwidth available in non-production equipment. One notable example is Sony's VISCA-compatible CVD-1000 Vdeck Computer Video Drive (\$2,295, from Sony Corp. of America, San Jose, California; 800-352-7669). When it's combined with the company's \$299.95 CI-1000 VBOX Video Computer Interface, you can drive the Sony directly with your PC; it also provides time-code indexing.

Other production-quality formats supported by these boards include 0.75-inch tape decks; all but the ADDA genlock to 1-inch tape decks. All the boards also genlock to VCR, broadcast camera, and Beta decks. Only the Willow VGA-TV GE/O does not genlock to S-VHS. For output, they can all record on con-

sumer VHS, S-VHS, broadcast camera, and 0.75-inch decks, and all but the ADDA can record on Beta and 1-inch media.

ALL-IN-ONE SOLUTION

Half of the eight boards we tested here—the ADDA, Aitech, Genoa, and Magni—work in tandem with your VGA or Super VGA card via a ribbon cable that plugs into the pass-through connector of your graphics adapter. If you have a slot shortage in your machine, however, you might want to consider one of the four boards that have an on-board PC graphics controller—the Cardinal, Everex, Truevision, and Willow Peripherals. All but the Willow, which uses an older, Tseng ET3000AX VGA

controller chip, use the Tseng ET4000 chip. The ET4000 is the fastest dumb frame buffer VGA chip on the market, but don't expect these VGA-to-NTSC boards to provide you with the same level of performance under Windows as cards using accelerator chips like the S3.

The results of PC Labs' Graphics Winmark test show a marked contrast among the VGA-to-NTSC boards reviewed, even though three of them used the same chip. Tseng chip-based video implementations can suffer from inefficient Windows drivers, which negate the inherent advantages of the chip.

The Everex and Truevision both run at 16 bits and performed at the top of this field on the Graphics Winmark test (1.49 and 1.47 million, respectively). The Cardinal, on the other hand, operates at 8 bits and performed at about half the speed. (A BIOS fix now available from Cardinal Technologies should speed things up.) The Willow performed better than the Cardinal, but it was still substantially slower (with a Winmark score of 0.83 million) than the 16-bit ET4000-based boards.

A VGA monitor has a horizontal scan frequency of 31.47 kHz, twice that of a TV. If a TV were noninterlaced, the ef-

fective scan frequency would be 31.47; thus, the VGA standard is the easiest, most cost-effective resolution at which to perform conversion to RS-170A. This also explains why most of these products output a maximum 640-by-480 resolution to an NTSC display, even though all the boards with on-board VGA support Super VGA, and the Cardinal and Everex even support resolutions up to 1,280-by-1,024.

Even at 640-by-480, you will run into the problem of *overscan*. The reason that a picture on a TV screen fills out to the edges of the tube is because the picture being broadcast is larger than the screen size. Your PC graphics adapter, however, displays a picture with a black dead area around the edges.

When converted to NTSC, the VGA image not only has a black border around it, but it is usually truncated around the sides because the original image isn't larger than the intended display size.

Five of the boards in this review allow you to compensate for overscan with an *underscan* toggle or vertical compression; this function is also available on some multiscanning monitors. The Magni distinguishes itself with its lack of overscan problems. If a board does overscan perceptibly, generally the only foolproof ways to prevent image cropping is to leave a border around any images you plan to transfer to tape, to lower the resolution to 640-by-400, or to switch to a higher-resolution output medium.

TAKE TWO ASPIRIN

While videotape can be a superior solution for mass distribution, it can also be a headache for the distributor. Although the technology for putting your computer-generated graphics onto videotape has been around for several years, the process remains as arcane and difficult as ever, especially for first-timers.

Installation can be confusing. You may have to run down to the local electronics store for the proper cables, which

The results of PC Magazine Labs' Graphics Winmark test show a marked contrast among the VGA-to-NTSC boards reviewed, even though three of them used the same chip.



OUR
WINDOWS
DISPLAY
COMES
WITH A
BUILT-IN
TEST
PATTERN

WHEN

IT COMES TO

PERFORMANCE AND VALUE,

the products of one company have consistently

caught the fancy of users and industry experts. The editors of

PC Magazine chose MAG InnoVision product three years running. Clearly, they like

what they see. So will you. OUR MICROPROCESSOR-BASED MX15F (15") and MX17F (17")

feature the latest flat square tube with Invar Shadow Mask technology for bright, distortion-free images.

Overscanning allows edge to edge active display, while on the MX17F, dynamic focus circuitry maintains focus across the entire screen area. High resolution – up to 1280 x 1024 non-interlaced opens additional Windows work space.

FIND OUT MORE. Contact us at 1-800-827-3998, or 4392 Corporate Center Drive, Los Alamitos, CA 90720. Tel: 714-827-3998. Fax: 714-827-5522.

© 1992, MAG InnoVision. All rights reserved. MAG InnoVision and its logo are trademarks of MAG InnoVision. Windows is a registered trademark of Microsoft Corp. All other brand and product names are trademarks or registered trademarks of their respective owners.

CIRCLE 067 ON READER SERVICE CARD



sometimes come in bizarre combinations (S-Video to RCA, for example).

The process of combining video with computer-generated graphics is not for the uninformed or the faint of heart; if you want high-quality output, it's not for the budget-conscious either. But if you're willing to devote the time required to learn the pitfalls of working in the medium, the results can be very rewarding.

ADDA Technologies Inc.

ADDA VGA-AVer

BY ROBERT KENDALL

The ADDA VGA-AVer works in tandem with your system's VGA card to provide a solid range of VGA-to-NTSC conversion functions. Along with re-

spectable performance, this \$645 board has a street price of about \$550; ADDA Technologies makes this deal even more appetizing by providing elementary audio support.

The board occupies an 8-bit slot and works with any standard VGA adapter. The VGA-AVer does not support the ATI VGAWonder Plus (which we used to test products with no on-board VGA)

■ **Video in a Window:** *Bringing Video to Your PC*

by Robert Kendall

VGA-to-NTSC conversion products are not the only links between the worlds of PC graphics and videotape. Several boards let you do the reverse—display video on a standard VGA monitor—by letting you plug a VCR or laserdisk player into a PC and display the video input in a monitor window.

With prices ranging from roughly \$500 to \$2,200, these boards all provide control over the image's hue, saturation, contrast, and brightness. Unless otherwise mentioned, most let you crop, pan, and zoom in on the image. They all let you capture a single video frame and save it as a graphics file; only VideoLogic's DVA-4000 Plug & Play kit and IBM's M-Motion Video Adapter/A (for MCA-based PCs) use proprietary formats.

All of these boards come with Microsoft Windows drivers, so you use them with multimedia authoring packages like AimTech Corp.'s IconAuthor or Asymetrix Corp.'s ToolBook.

Most of these boards let you overlay VGA graphics on your motion-video image. If you want several live video images on-screen at once, you can install multiple boards in your PC and connect each to a video device. A single VideoLogic board lets you display two video windows simultaneously, and the boards from IBM and Aitech International Corp. can support up to three windows at once under DOS.

A LOOK AT THE OPTIONS

VideoLogic's \$2,195 DVA-4000 Plug & Play kit (Cambridge, Massachusetts; 617-494-0530), is one of the most ex-

pensive and full-featured of these products; a Super VGA daughtercard costs \$200. You can crop the 16.7-million-color video image, pan it, and mask its luminance or chrominance.

The VideoLogic board supports audio and composite, S-video, or RGB video input. Of the units in this sidebar, only the VideoLogic board lets you fade or dissolve the video image or the VGA graphics independently.

The \$2,250 M/Motion board, from IBM (Atlanta, Georgia; 800-426-9402), offers on-board VGA and a 2.1-million-color video image that you can crop, pan, and fade out. The board supports S-video and audio.

Redlake Corp. (Los Gatos, California; 408-399-5000) offers its Spectrum NTSC+ in both a 16.7-million-color version (\$1,650) and a monochrome version (\$1,400), each with VGA pass-through. The board supports composite, S-video, and RGB input, but it uses a jumper rather than software to switch video sources. You can zoom in on the video image, but you can only scale it down to three fixed sizes, and you can't crop or pan it. The only audio support is for one mono input (the other boards that have audio input also offer stereo input).

The \$1,295 Bravado, from Truevision (Indianapolis, Indiana; 317-841-0332) includes on-board 1,024-by-768, Super VGA, and VGA at 256 colors. The \$1,495 Bravado16 adds support for 16-bit VGA color and S-video input, as well as audio. It also works with a JPEG compression board, so you can play motion video from your hard disk or CD-ROM player.

You can zoom or crop the Bravado's 2.1-million-color video image, but you can't pan it. It supports masking and lets you control the RGB values.

Matrox Electronic Systems Ltd. (Dorval, Quebec, Canada; 800-361-4903) markets its Marvel at \$995 with VGA pass-through; \$1,295 with on-board Super VGA and 512K of RAM; and \$1,495 with on-board Super VGA, 1MB of RAM, and S-video support. The Marvel produces a 16.7-million-color image, and it supports audio and input from JPEG video compression boards. The Marvel offers a wide range of video special effects: masking, video trails, a mosaic feature, flipped or spun images, and more.

The \$995 ProMotion, from IEV International (Salt Lake City, Utah; 800-438-6161), relies on VGA pass-through; S-video and audio support costs \$125 more. It supports masking, but the video image uses only 32,768 colors.

New Media Graphics (Billerica, Massachusetts; 800-288-2207) offers Super VideoWindows for \$895 (\$995 for an MCA version). A \$395 Super VGA daughtercard provides 256 simultaneous colors. A \$395 TV tuner lets you watch TV in a window, and a \$250 option supports S-video. You cannot crop or pan the 16.7-million-color video image, but the board does support audio.

The \$895 Pro PC/Video, from Aitech International Corp. (Milpitas, California; 408-946-3291), uses VGA pass-through and produces a 2.1-million-color video image. An S-video option costs \$129. It supports masking,

VGA-to-NTSC Boards

in Super VGA modes, however.

To install the VGA-AVer, you must connect a ribbon cable to a socket on the board and then to the feature connector on your VGA board. Unfortunately, the only cable supplied with the board has a card-edge connector. The vendor sent us an additional ribbon cable that could connect to a VGA card with a socket feature connector (if your setup requires this ca-

ble, the company will send one upon request).

The VGA-AVer provides video input and output jacks for composite video only, but a \$75 add-on (which takes up an extra slot) can accommodate S-video and RGB.

SIGHT AND SOUND

The "AV" in the product's name stands for Audio Video, referring to the board's unusual support for audio pass-through. There's an audio line in, a microphone jack, and even a cable you can connect to your PC's speaker. The board mixes the signals from these three audio sources and outputs them through a single RCA jack.

This could be useful for adding a voice-over to a musical sound track or for capturing the PC's beeps for a demo tape. The software lets you toggle the three audio inputs on and off independently. You don't have any control over volume or support for stereo, however, so the value of these features will be limited if you need to do sophisticated production work.

The VGA-AVer performed respectably on our Noise-F and Noise-G benchmark tests: -54.5 dB RMS and -57.9 dB RMS, respectively. Its High-Frequency Response scores were among the best over the entire range; at the 2.0-MHz mark, its -0.02-dB result was excellent. Its



Subcarrier Horizontal Phase result was within the accepted range, and no color shifting turned up visually or on our tests, as exemplified by its Phase Shift result of 0 degrees.

In terms of our hands-on testing, the NTSC image produced from VGA graphics flickered strongly, enough to obscure some details. The board's software offers an unusual way around the flicker problem by optionally changing the way the NTSC output is scanned: The software can scan only odd- or even-numbered lines to produce noninterlaced, flicker-free output, which can still

Videomail (Sunnyvale, California; 408-747-0223) offers its VMC-1 in three versions, each with VGA pass-through and a 2.1-million-color video image. For \$795, you get two fixed-size video windows: one-quarter and one-sixteenth of the screen. The \$995 version adds full-screen video. The \$1,295 version adds single-frame capture in JPEG format. Unlike most competitors, however, the VMC-1 can't display video if your software is running in a VGA mode higher than 640-by-480 with 256 colors.

High Res Technologies (Lewiston, New York; 416-497-6493) sells its VGA Video Gala for \$595, including on-board Super VGA. An S-video option is \$50. The video image uses 16.7 million colors, but you can't overlay VGA graphics onto it. The board doubles as a VGA-to-NTSC converter.

Creative Labs (Milpitas, California; 408-428-6600) offers its Video Blaster for \$495; it has VGA pass-through and creates color video images from a palette of 2.1 million colors. The board supports masking and audio.

Videomail's \$395 VMC-3 with VGA pass-through provides full-screen video; the \$495 VMC-3 Plus adds video windows in two fixed sizes. As a window, the 2.1-million-color video image can be displayed only when the software is running at 640-by-480 resolution or lower; also, you can't crop or pan the window image or overlay graphics onto it. The VMC-3 features audio support and a built-in television tuner. A daughtercard due out this fall will allow frame captures. □

C the Future



ISBN 1-56276-069-6
Price \$29.95



ISBN 1-56276-040-8
Price \$39.95

If you're new to C programming or looking to sharpen your skills, **PC Magazine Guide to C Programming** will get you the results that you want. Internationally acclaimed author and C instructor, Jack Purdum, provides a solid foundation in all aspects of C programming.

World-renowned expert William Roetzheim shows you how to make Windows Graphical User Interface application development a productive and rewarding experience in **PC Magazine Programming Windows with Borland C++**. This unique book/disk package covers object-oriented programming, the Windows Application Program Interface, and the Object Windows Library.



Available at fine bookstores, or call
1-800-688-0448
ext. 8411

© 1992 Ziff-Davis Press



Graphics Compromises

Let ATI's New GRAPHICS ULTRA Cards Pump You Up.

Today's graphics cards grind you down to their level, forcing you to give up speed for resolution, or resolution for realistic color. But why get bulldozed into a compromise?

ATI's new GRAPHICS ULTRA cards give you all-round performance... speed, color and resolution all at the same time.

25.5m
WIN
BENCH

Top Speed: 25 million WINMARKS*

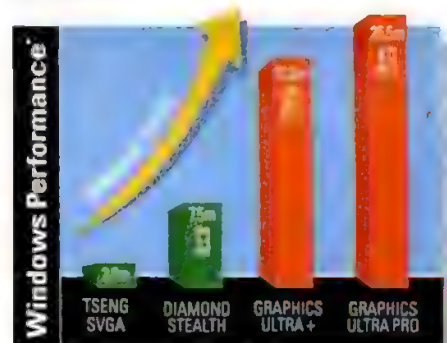
Competing S3 solutions decelerate your display with slow data transfer rates and plodding VGA performance

ATI's new GRAPHICS ULTRA cards are up to three times faster: leaving even local-bus solutions behind in the dust. Our second-generation Mach 32 graphics processor and linear addressing design give *concrete* performance, up to a remarkable 25 million WINMARKS.

Loaded with 2.0MB of video memory, ATI GRAPHICS ULTRA cards give you solid colors, without squashing your display down to pedestrian resolution. Run 1024x768 with 65,000 colors, at accelerated speed. Or work in true 24-bit



color, at up to 800x600. AT refresh rates up to 76Hz for flicker-free graphics.



Our single Windows driver supports painless mode switching, plus an expanded Virtual Desktop, for convenient scrolling and panning. And you get laser-quality displays



Leaving You Flat?

with ATI's hardware-accelerated True Type font scaling and smoothing, courtesy of our exclusive CRYSTAL Font technology.

mach 32

Paving the Way to Multimedia

ATI GRAPHICS ULTRA cards accelerate the latest multimedia applications, with hardware decompression and direct color modes. (Multimedia drivers available November 1992.) Hardware-assisted "StretchBit" image scaling lets you widen video images to full-screen with no slowdown.

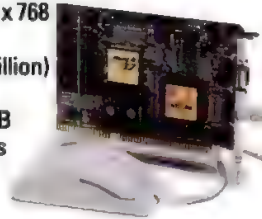
Resolution and Color Support	ATI	S3	SVGA
1024 x 768 / 85,000	■	■	■
1024 x 768 / 256	■	■	■

Two-Way Stretch

ATI gives you two ways to construct the perfect solution. The GRAPHICS ULTRA PRO uses VRAM for the ultimate fast-lane performance, at workstation resolutions up to 1280x1024, non-interlaced. The GRAPHICS ULTRA+ uses a highly optimized internal architecture and less expensive DRAM to provide amazing speed at a price that definitely won't leave you flat broke.

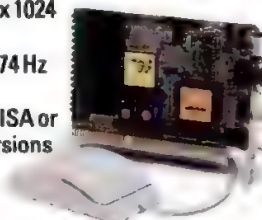
GRAPHICS ULTRA +

- ▶ Fast 21.0 million WINMARK* performance
- ▶ Accelerated 1024 x 768 at 65,000 colors
- ▶ True color (16.7 million) at 800 x 600
- ▶ Available in 2.0 MB or 1.0 MB versions
- ▶ Priced from \$399.00**



GRAPHICS ULTRA PRO

- ▶ Fast 25.5 million WINMARK* performance
- ▶ Accelerated 1280 x 1024 at 256 colors non-interlaced at 74 Hz refresh rate
- ▶ Available in ISA, EISA or MicroChannel versions
- ▶ Priced from \$599.00**



Avoid *crushing* disappointment. ATI GRAPHICS ULTRA cards are the painless route to all-round performance.

ACCELERATORS • GRAPHICS • MULTIMEDIA • COMMUNICATIONS



Perfecting the PC

ATI TECHNOLOGIES INC.
3761 Victoria Park Avenue
Scarborough, Ontario
Canada M1W 3S2
Tel: (416) 756-0718
Fax: (416) 756-0720

Copyright © ATI Technologies Inc., 1992. All company and/or product names are trademarks and/or registered trademarks of their respective manufacturers. **Suggested Retail Price in US\$. Prices subject to change without notice. *Winbench 2.5 on 486-33 at 1024 x 768 / 256 colors at 60 Hz. Awards based on award winning technology of GRAPHICS ULTRA and VGA WUNDER

CIRCLE 337 ON READER SERVICE CARD

HEAVY METAL SUPERVGA.

Introducing Thunder & Lightning from MediaVision. For the first time, 24-bit SuperVGA and super sound — on a single card.

Some things are meant to go together. Like rock — and roll. Graphics — and audio. And Thunder & Lightning™ — the premier single-card multimedia solution for your PC.

Thunder & Lightning... in 16.8 million colors.

The sky's the limit with Thunder & Lightning — the first affordable 24-bit graphics and sound card that adds flash to your presentations and games. And high-voltage power to Windows 3.1™.

In addition to the traditional 16 and 256 palettized color capabilities, Thunder & Lightning supports 24-bit color depth. Providing the simultaneous display of up to 16.8 million colors for the utmost photo-realistic graphics.

And it comes with many stunning features. Like high-resolution display supporting graphic modes up to 1024 X 768 X 256 colors for the most stringent power user. Plus 1MB standard video memory and flicker-free vertical refresh. And Thunder & Lightning conforms to all VESA standards.

The single-card SuperVGA solution that's "ears" ahead.

In fact, Thunder & Lightning is the ultimate entertainment platform — compatible with the hottest new games and audio cards, including ThunderBoard™, Sound Blaster™, AdLib™ and Windows 3.1.

Plus you're showered with such heavy-duty features as the Yamaha 3812 synthesis chip, dynamic filtering, real time hardware compression and decompression, and a 16-bit I/O interface.

All this, and extensive software support, too. Like graphics and audio drivers for DOS and Windows 3.1. A joystick port. Free technical support.

And yes, it even comes with a full package of Windows-based software. Lotus Sound™, for recording and playback. Sound Forge™, a wave form editor. At Your Service™, an animated talking calendar. Monologue for Windows, a text to speech synthesizer. Master Tracks Pro Demo™, a working sample of the popular MIDI sequencer. And Pocket Recorder™, a convenient recording, editing, and playback program. **Thunder & Lightning—the multimedia value that reigns supreme.**

So for the single-card multimedia solution that's taking the world by storm, the forecast calls for Thunder & Lightning. Visit your nearest computer store today.



MEDIA VISION

For more information call 1-800-845-5870.

Media Vision, 47221 Fremont Boulevard, Fremont, CA 94538 510-770-8600, FAX: 510-770-9592

Media Vision, Thunder & Lightning and ThunderBoard are trademarks of Media Vision, Inc. © 1992, Media Vision

CIRCLE 093 ON READER SERVICE CARD

VGA-to-NTSC Boards

be overlaid onto video. But since this process reduces your image to half its original resolution, it is usually an impractical solution.

The product handled genlocking and overlaying well. To control the process, you can pop up a TSR menu on the VGA monitor, while the NTSC monitor displays only the images you want to work with. The TSR consumes a relatively hefty 35K.

You can toggle through 256 possible key colors and watch the results of each selection on-screen as you do so. There's even an option to make the key color opaque and all other colors transparent. By flipping another toggle, you can make the NTSC monitor display the overlaid VGA and NTSC signals or either signal separately.

There are options for horizontal underscan and overscan to help a VGA image fit on the NTSC screen. The VGA-AVer is one of the few boards that also lets you compress an image vertically to fit the NTSC screen. You can pan the image horizontally or vertically, zoom in on it, or display it as a monochrome image on the NTSC monitor.

The VGA-AVer offers little control over the characteristics of the NTSC signal that is input for genlocking. You can't fade the signal in or out or control its hue, contrast, or other elements. Another drawback is the documentation, which is riddled with grammatical obscurities.

Bundled with the VGA-AVer comes Entropy Engineering's Video Titler, which lets you create titles or display .PCX files for overlaying. Video Titler provides the same delays and transition effects familiar to users of screenshow programs, though this package is harder to use than most screenshows.

The ADDA VGA-AVer provides performance and offers a rudimentary audio mixer that helps distinguish it from other products. Although its scan-converted images don't match the clarity of those produced by some of the other products in this roundup, the ADDA VGA-AVer is a very reasonably priced alternative for users looking for an inexpensive way to experiment with VGA-to-NTSC technology.

Aitech International Corp.

Aitech ProVGA/TV Plus

BY JOHN R. QUAIN

Middling performance, adequate abilities, and an intermediate price make the

\$995 Aitech ProVGA/TV Plus a middle-of-the-road offering. After comparing it with the other contenders in this roundup, most buyers will probably choose to bypass this VGA-to-NTSC adapter.

The ProVGA/TV Plus is an update of the Aitech ProVGA/TV; the "Plus" in the new product's name refers to the new features that Aitech has incorporated. The board now includes a flicker-reduction circuit to improve the look of 1-pixel-wide lines on interlaced NTSC monitors, fade-in and fade-out controls, and control software compatible with Microsoft Windows 3.x.

The ProVGA/TV Plus is a straightforward genlocking and overlay board that accepts composite and S-video NTSC sources. It has no on-board VGA; the VGA signal from your existing video adapter passes through this product via a supplied feature connector cable.

To view overlaid graphics, you will need an NTSC-compatible monitor or television. The 16-bit ProVGA/TV Plus is outfitted with a pair of RCA jacks for

FACT FILE

ADDA VGA-AVer

ADDA Technologies Inc., 4801 Warm Springs Blvd., #105, Fremont, CA 94539; 510-770-9899; fax, 510-623-1803

List Price: With 8-bit ISA board, VGA pass-through cable, speaker connector cable, DOS control utilities, Video Titler, \$645; S-video and RGB add-on boards, \$75.

Requires: Standard VGA or multiscanning monitor, NTSC video monitor, VGA or Super VGA board.

In Short: The ADDA VGA-AVer offers a good range of options, including even rudimentary audio support, although its images are not as clear as those of some other products. This board is a good choice for those looking for a low-cost way to experiment with this technology.



ON READER SERVICE CARD

Performance Breakthrough!
**486 upgrades
are here...**

for PS/2 Models 70 & 80.

Up to **5 TIMES** the performance
with a zero slot solution.

Call 800-446-4525 today for details!

Σ Sigma Data
THE UPGRADE SPECIALISTS

P.O. BOX 1790, NEW LONDON, NEW HAMPSHIRE 03257 FAX 603-526-6915

CIRCLE 213 ON READER SERVICE CARD

"True Color and Speed at the right price"



July 1992

24-bit True Color — It's the next step in color display technology. And the Matrox Impression™ 1024 graphics accelerator sets the standard for the ultimate in speed, color and resolution for Microsoft® Windows®.

The industry standard 1024 x 768 resolution at full 24 bits translates into photorealistic color display quality that's simply stunning when retouching your color images. No more washed out 8-bit color approximations when using your favorite Windows applications such as Aldus® PhotoStyler™, CorelDRAW!®, and others.

And what about speed? Impression 1024 was benchmarked by PC Magazine as three-to-ten times faster than 8-bit Super VGAs under Windows.

Impression 1024 Fact File

Resolution	1024 x 768
Bits/pixel	24
Colors	16.7 million
Refresh rate	70 Hz
Compatibility	100% VGA
Speed	3x to 10x Super VGA
Technology	VRAM
Warranty	5 years
Price	\$1,295

\$1,295

Impression 1024 comes with three essential utilities for really productive 24-bit graphics work under Windows: **PixelTouch™** for hardware pan and zoom, **ConsistentColor™** for monitor calibration, and **WinSqueeze™** for on-the-fly JPEG image compression.

And at \$1,295, Impression 1024 is almost **half** the price of the competition.

For more information, call (800) 361-1408 or (514) 685-2630

Ask for your colorful, 12-page brochure of the **Impression** line of five graphics accelerators. At a staggering 1600 x 1200 resolution, the Impression Ultra is the only 24-bit graphics accelerator of this caliber on the market today.

Dealer inquiries welcome

matrox
PRODUCTIVITY. PERFORMANCE. VISIBLE SOLUTIONS.



See us at
Seybold
booth 2242

San Jose
Sept. 23-25



Matrox is a registered trademark of Matrox Electronic Systems, Ltd.
Impression, PixelTouch, ConsistentColor, and WinSqueeze
are trademarks of Matrox Electronic Systems, Ltd.
All other trademarks are the properties of their respective owners.

CIRCLE 15 ON READER SERVICE CARD

VGA-to-NTSC Boards

composite video and a pair of S-video jacks for connecting Hi-8 and Super VHS equipment. The board also includes an RCA-to-BNC adapter.

Software bundled with the ProVGA/TV Plus includes DOS and Windows 3.x control utilities, and Entropy Engineer-

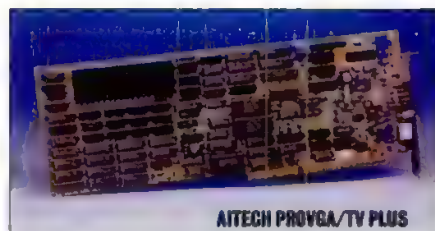
brightness to one of eight levels, choose between two brightness settings for the composite video input, and select horizontal overscan or underscan. By using the chroma settings, you can adjust the board so that it will key one VGA color value or up to 256 colors.

Additional software selections let you overlay a VGA image on live video, mix the two signals, or display just the VGA or video source. Overlaid VGA graphics can align with the top, bottom, or center of the screen, but even in underscan mode, approximately half an inch of the vertical portion is cropped off (as is the case with most of the products). Furthermore, fading VGA graphics in and out is not as smooth as it could be.

Initial tests using an ATI VGA-Wonder Plus adapter created some color palette discrepancies. Aitech could not duplicate our results, and could not resolve the problem. We conducted subsequent tests using a Tseng chip-based Orchid ProDesigner II without incident, but users with older ATI cards should be aware of the potential incompatibility.

TESTING THE BOARD

On our NTSC signal tests, the ProVGA/TV Plus's output noise level in non-genlock mode was respectably low (second only to the Magni VGA Producer Pro). Once genlocking was enabled, however, the amount of noise increased compared



AITECH PROVGA/TV PLUS

with that of the other boards. Its composite-video brightness levels were respectable, with a Gain test score of 90 IRE. Its performance on the High-Frequency Response tests was just less than -3 dB at 2.0 MHz, indicating some loss of image sharpness at that point, though the other frequency levels held up well.

For our hands-on tests, superimposed animation revealed a noticeable amount of fringing and some color bleeding around red objects. There also was a sig-

The ProVGA/TV Plus
is one of only two
products reviewed here
to come bundled with
Windows control
utilities.

ing's Video Titler software. (The Cardinal SNAPplus is the only other package to include Windows control utilities.) The ProVGA/TV Plus's DOS pop-up utility requires approximately 12K of memory, and both the DOS and Windows utilities let you superimpose VGA graphics with up to 256 colors over composite video.

The ProVGA/TV Plus does not offer extensive effects, because the board conducts only straightforward pass-through and genlocking tasks. But software controls do allow you to change the VGA

FACT FILE

Aitech ProVGA/TV Plus

Aitech International Corp., 830 Hillview Ct.,
#145, Milpitas, CA 95035; 800-882-8184,
408-946-3291; fax, 408-946-3597

List Price: With 16-bit ISA board, single BNC-to-RCA adapter, VGA pass-through cable, DOS and Microsoft Windows control utilities, Video Titler, \$995; composite, S-video, and RGB cables, \$59 each.

Requires: Standard VGA or multiscanning monitor, NTSC video monitor, VGA or Super VGA board.

In Short: Distinguished only by the inclusion of a Microsoft Windows 3.x control program, the Aitech ProVGA/TV Plus does not offer the performance or features of some of the other products in this roundup. Though adequate for amateur video work, it is not up to the standards set by the Magni VGA Producer Pro and Truevision VideoVGA.



What if...

fat forms put you in a jam?

Don't redesign your form. Rethink your printer. Datasouth heavy-duty dot matrix printers have a straight paper path instead of a curved one to handle tons of multipart forms, invoices, labels, bar codes and shipping documents. All at speeds from 300-620 cps without a slip, crunch or breakdown of will power. DEC, IBM and PC compatible, Datasouth printers feature high torque tractor feed, zero tear-off and a high-powered ballistitic printhead to clearly keep your printing under control. For steadfast printing, take the straight path to Datasouth. Call 1-800-476-2120

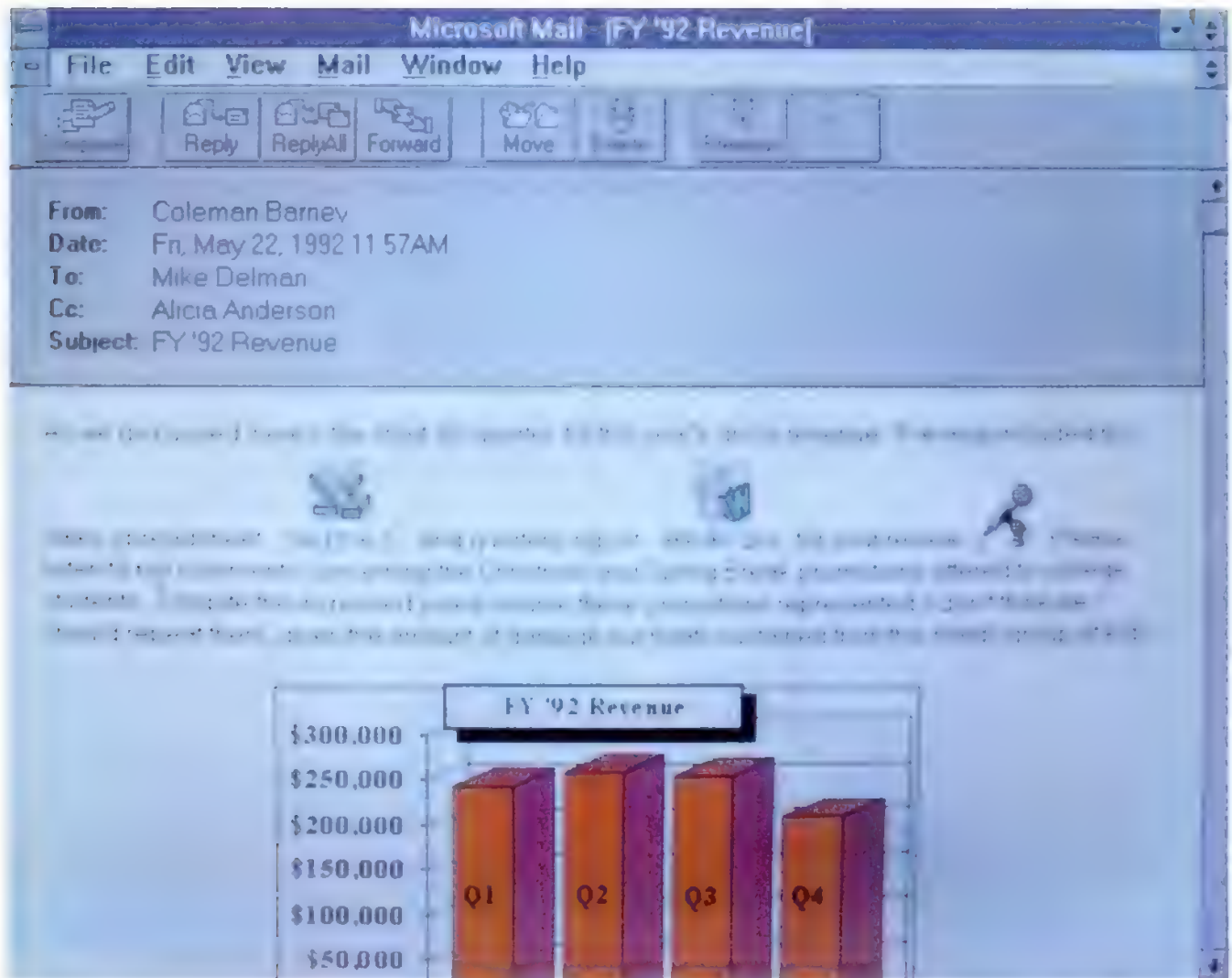


Datasouth
AMERICA'S HIGH PERFORMANCE
PRINTER COMPANY

P.O. Box 740947, Charlotte, NC 28274
(704) 523-8500 - Fax (704) 523-9298
Sales 1 800 476 2120 - Service 1 800 476 2450
© 1997 Datasouth Computer Corporation

CIRCLE 171 ON READER SERVICE CARD

We've brought n the expression,



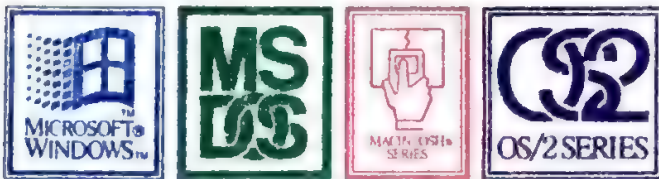
Now you can send virtually anything and everything through the mail. How's that for effective communication?

With the help of our all-new Microsoft® Mail version 3.0, you can now send and receive virtually anything through the mail. So there's no excuse for not getting your message

across. We're talking charts, pictures, sound, parts of spreadsheets and other documents, even entire files. And you can place them anywhere you want in your messages.

ew meaning to “It’s in the mail.”

Furthermore, you can send mail while you are working in another software program. Like, say from your word processor or spreadsheet.



Microsoft Mail 3.0 supports every popular desktop computing platform.

And when you get a message with a file attached, just double-click on the icon and Mail will launch the application and open the file.

Pretty impressive, isn't it? Well, equally impressive is how easy it is to use. Take our Toolbar for instance. It allows you to perform everyday functions with the simple click of a button. Everyday things such as managing, sending, forwarding, replying and deleting mail messages.



Thanks to our built-in spell checker, there's never an embarrassing typo.

Or how about a global address list to easily send mail to anyone, anywhere – whether they are down the hall or down the road?

Or a personal address book to maintain a private list of individuals or groups you mail regularly?

And let's not forget our new Message Finder. It helps you find all of those super important messages with newfound ease.

Lastly, when it comes to connectivity you should really come to expect the world of us. We offer the largest selection of full-featured gateways of any LAN e-mail vendor.



Introducing the all-new Microsoft Mail 3.0. It's part of a complete line of software applications.

Which means you'll be able to send messages clear across the planet.

To learn more, or if you'd like to receive a free Working Model, just pick up the phone and give us a call at (800) 227-4679, Dept. HI7.

And the next time somebody asks for a copy of that sales report, or whatever, tell them it's in the mail.

Microsoft
Making it easier

► **SUMMARY OF FEATURES**

VGA-to-NTSC Boards

Products listed in alphabetical order

■ = YES □ = NO



	ADDA VGA-AVer	Aitech ProVGA/TV Plus	Cardinal SNAPplus	Everex Vision VGA with Overlay	Genoa VGA2TV	Magni VGA Producer Pro	Truevision VideoVGA	Willow VGA-TV GE/O
List price (tested configuration)	\$645	\$995	\$1,295	\$895	\$499	\$1,995	\$1,195	\$695

VGA-to-NTSC Characteristics

Encoder-chip manufacturer	Motorola	Sony	Sony	Motorola	Genoa	Magni	Truevision	Motorola
Connectors:								
RCA	■	■	□	■	■	■	■	■
BNC	□	■	□	□	□	■	□	□
S-Video	Optional (\$75)	■	■	■	■	■	■	■
Input/output formats supported:								
Composite NTSC	■	■	■	■	■	■	■	■
PAL	■	□	■	□	□	□	□	□
SECAM	□	□	□	□	□	□	□	□
S-Video	■	■	■	■	■	■	■	■ (output only)
RGB analog	■	□	■	■	■	■ (output only)	□	■ (output only)
Still-Video System (SVS)	□	□	■	■	□	□	□	■
RF modulator	□	■	■	■	□	□	□	■ (output only)

NTSC Output

Maximum resolution (pixels)	720 x 400	640 x 480	640 x 480	512 x 480	640 x 480	768 x 480	640 x 480	640 x 480
Maximum number of colors	256	256	16.7 million	256	256	256	256	256
Supports separate sync	□	□	□	■	□	■	□	□
Allows screen blanking	□	■	■	■	■	■	■	■
Overscan/underscan controls	■ ■	■ ■	■ ■	■ ■	□ □	■ ■	□ ■	□ □
Vertical/horizontal controls	■ ■	■ ■	■ ■	■ ■	□ □	■ ■	□ □	■ ■

Video Effects and Editing

Software-controlled keying	■	□	■	■	■	□	■	■
Grabs video in single frame	□	■	■	□	□	□	□	□
Freezes video in a frame	□	□	■	□	□	□	□	□
Converts video-in to gray 1-1 scale	□	□	■	□	□	□	□	□
Converts video-in to negative	□	□	■	□	□	□	□	□
Provides image fade-in or fade-out	□	■	■	□	□	■	■	□
Changes RGB values	□	□	■	□	□	□	□	□
Hue/Saturation	□ □	□ □	■ ■	■ ■	□ □	□ □	□ □	□ □
Brightness/Contrast	□ □	□ □	■ ■	■ ■	□ □	□ □	□ □	□ □
Anti-jitter/anti-flicker filter	□ ■	□ ■	□ □	■ ■	□ □	■ ■	□ □	□ □

VGA Characteristics

VGA	Pass-through	Pass-through	On-board	On-board	Pass-through	Pass-through	On-board	On-board
VGA controller	N/A	N/A	Tseng ET4000	Tseng ET4000	N/A	N/A	Tseng ET4000	Tseng 3000AX
BIOS version	N/A	N/A	Cardinal 2.01	Everex 1.01	N/A	N/A	Tseng 8.00	Willow/ Tseng 1.11
On-board display memory	N/A	N/A	1MB	1MB	N/A	N/A	1MB	512K

N/A—Not applicable. The product does not have this feature.

CONTINUES

HARDWARE

VGA-to-NTSC Boards

► SUMMARY OF FEATURES

Products listed in alphabetical order								
	ADDA VGA-AVer	Aitech ProVGA/TV Plus	Cardinal SNAPplus	Everex Vision VGA with Overlay	Genoa VGA2TV	Magni VGA Producer Pro	Truevision VideoVGA	Willow VGA-TV GE/O
■ = YES □ = NO VGA Characteristics (continued)								
Video standards:								
1,280 x 1,024	N/A	N/A	■	■	N/A	N/A	□	□
1,024 x 768 noninterlaced	N/A	N/A	■	■	N/A	N/A	□	□
1,024 x 768 interlaced	N/A	N/A	■	■	N/A	N/A	■	■
Super VGA (800 x 600)	N/A	N/A	■	■	N/A	N/A	■	■
VGA (640 x 480)	N/A	N/A	■	■	N/A	N/A	■	■
Maximum addressable resolution	N/A	N/A	1,024 x 768	1,280 x 1,024	N/A	N/A	1,024 x 768	640 x 480
Maximum displayable resolution	N/A	N/A	1,024 x 768	1,280 x 1,024	N/A	N/A	1,024 x 768	640 x 480
Maximum number of colors simultaneously displayable (resolution)	N/A	N/A	65,000 (1,024 x 768)	256 (1,024 x 768)	N/A	N/A	256 (1,024 x 768)	256 (640 x 480)
Drivers	N/A	N/A	AutoCad, Gem, Lotus 1-2-3, Microsoft Windows, OS/2, Ventura Publisher, WordPerfect	AutoCad, Gem, Lotus 1-2-3, Microsoft Windows, OS/2, Symphony, WordPerfect	N/A	N/A	AutoCad Lotus 1-2-3, Microsoft Windows, Ventura Publisher, WordPerfect	AutoCad, GEM Lotus 1-2-3, Microsoft Windows, Ventura Publisher, WordPerfect
Technical Support and Warranty								
Technical support hours (Eastern time, Monday through Friday)	12:00-8:00	12:00-8:30	9:00-5:00	11:00-8:00	12:00-7:00	11:00-8:00	8:00-6:00	10:00-6:00
Toll-free number	□	■	□	■	□	■	□	■
BBS	□	■	■	■	■	■	■	■
Warranty	1 year	1 year	1 year	2 years	2 years	1 year	1 year	3 years

ENDS

nificant amount of jitter and flicker on Windows images displayed on the NTSC monitor. Numbers and letters in spreadsheets, for example, were nearly unreadable. (The anti-flicker circuit works only in text mode and not in image or graphics mode.)

As with half of the tested boards, the ProVGA/TV Plus's composite-video output could not produce a stable result on our Phase Shift test. On our Subcarrier Horizontal Phase test, however, the ProVGA/TV Plus exhibited an inordinate degree of deviation; this suggests that extensive editing on videotape may result in some color skewing.

These problems aside, the ProVGA/TV Plus will perform genlocking tasks well enough to create basic video presentations and amateur videos. For such uses, however, Aitech International Corp.'s user manual could use some improvement. It provides instructions on how to enable various software controls, but the descriptions of what each control

does could be better written.

The Aitech ProVGA/TV Plus's image quality is not up to that of the adapters offered by Magni Systems or Truevision, but this and its mediocre performance are somewhat compensated for by the inclusion of Windows-compatible control utilities. The Windows-based controls are not as extensive as those of the Cardinal SNAPplus, but then again, neither are its features on the whole.

Cardinal Technologies Inc.

Cardinal SNAPplus

BY JOHN R. QUAIN

If you want one product that meets all your PC video needs, the Cardinal SNAPplus is a fine choice. Among the products reviewed here, the \$1,295 SNAPplus is versatile; not only does it have on-board VGA and genlocking, it also has the ability to capture live video images, play graphics animation, and dis-

play NTSC video on a VGA computer monitor.

A 16-bit ISA adapter, the SNAPplus has connections for a VGA monitor and S-video input and output. The S-video jacks are not the standard four-pin models found on most consumer video equipment, but rather 8-pin DIN connectors. Cardinal Technologies does include composite-video connecting cables (one RCA and one standard S-video) for the adapter, as well as an RGB cable. The SNAPplus also supports PAL video sources and has a video control connection for products that support computer-controlled editing, such as NEC's PC VCR and Fuji's Digital Image Camera DS-100.

Rather than just synchronizing the NTSC video with the VGA video and passing it through to an NTSC monitor or VCR, the SNAPplus actually digitizes the NTSC video so that it can be displayed on a VGA monitor. That means that unlike other adapters in this

VGA-to-NTSC Boards



roundup, the SNAPplus does not require two monitors.

VGA video is managed by a Tseng ET4000 controller running at only 8 bits. The two other boards with this chip (the Everex Vision VGA with Overlay and the Truevision VideoVGA) employ the chip at 16 bits. Unsurprisingly, the SNAPplus produced about half the Graphics Winmark throughput as these two boards. (The company now has a BIOS fix that will improve the board's Windows speed.)

The SNAPplus board includes 1MB of VRAM and 1MB of DRAM. All of the dual-ported VRAM is allocated as frame-buffer memory so that composite video images can be captured and stored as 16- or 24-bit .BMP or Targa files. (Cardinal Technologies should also offer .GIF, .PCX, and TIFF formats by the time you read this.) The remaining megabyte of DRAM is used as the VGA frame buffer.

The SNAPplus supports a maximum noninterlaced graphics resolution of 1,024-by-768 and a palette of 65,000 possible colors. The maximum NTSC output resolution for recording and overlaying purposes is only the standard 640-by-480 at a 72 Hz refresh rate, but the live video is displayed from a palette of 16.7 million colors.

IMPRESSIVE SOFTWARE

Perhaps the most impressive part of the SNAPplus package is its control software. The SNAPshot program, which is compatible with Microsoft Windows 3.x, lets you edit like a pro. You can also perform a variety of special effects, including grabbing video stills, freezing live video in a frame, converting the NTSC video to gray scale (for DTP work), switching to a negative image, panning and zooming live video in real time, and more. (There is also a fade in/fade out feature, but the company has admitted that it is hard to use.)

Each selection can be made from a

pull-down menu or an icon bar. All of the controls are simple to operate. To select a key color, for example, you simply click on the item or area you want to overlay. The standard television controls—including hue, saturation, contrast, and brightness—are displayed above a client window, into which you can insert graphics animation, live composite video, or both.

Furthermore, the program can control AutoDesk graphics animation sequences, including fades and speed settings. For videotaping, the program allows you to remove the Windows border so that only the animation and NTSC video will be recorded. Unfortunately, a DOS utility for the SNAPplus was not available in time for our tests, though Cardinal plans to release a TSR to control color keying.

MEASURING PERFORMANCE

On PC Magazine Labs' Gain test, the SNAPplus showed significant loss of signal strength. Though its result was still within tolerable levels, keen eyes may detect some loss of picture brightness on the composite-video output. Its high-frequency response did not begin to drop off until after the 2.0-MHz point (although the drop-off at 3.0 MHz and 4.1 MHz was severe). This means that the board's horizontal resolution is as good as that of most consumer VCRs.

The SNAPplus's video noise level without genlocking was good (-53.6 dB RMS). With genlocking enabled, how-

ever, the amount of signal noise (-53.1 dB RMS) placed this adapter in the bottom half of the group on our Noise-G test. As with several of the boards we tested, the SNAPplus's NTSC output was not stable enough to produce a precise color accuracy reading; the board also could not produce a result for the Subcarrier Horizontal Phase test.

Despite these test scores, the image flaws we detected during our hands-on tests were not nearly as serious as those

The Cardinal SNAPplus digitizes the NTSC video so that it can be displayed on a VGA monitor. This means that it does not require two monitors, as do other adapters.

of some of the other adapters we looked at. There were only minor fringing effects on small titles and some slight pixilation on the VGA monitor's NTSC video display.

And despite the SNAPplus's lack of an anti-flicker circuit, Microsoft Excel fonts and numbers were quite legible. On Windows graphics, however, users will unfortunately notice some vertical over-scan, which clips approximately half an inch off the overall image displayed on an NTSC monitor.

In case you are still unimpressed by the features the SNAPplus has to offer, the company is building an even stronger platform. By the time you read this, Cardinal will include Mathematica's Tempura Show authoring software, and a new version of the SNAPplus will be able to store 15 frames per second of live video on your hard disk.

Though not the cleanest performer in the crowd of products tested for this feature, the Cardinal SNAPplus is the most full-featured by far. For DTP or desktop video work, this may be the adapter you will elect to buy.

► FACT FILE

Cardinal SNAPplus

Cardinal Technologies Inc., 1827 Freedom Rd., Lancaster, PA 17601; 800-233-0187, 717-293-3000; fax, 717-293-3055

List Price: With 16-bit ISA board; composite, S-video, and RGB cables; Microsoft Windows control utilities, \$1,295.

Requires: Standard VGA monitor, NTSC video monitor.

In Short: Offering an impressive array of features and effects, the Cardinal SNAPplus, which includes a Tseng ET4000 chip, can handle tasks required by DTP and desktop video editors alike. Though its images could be brighter, most users should be pleased with the results.



ON READER SERVICE CARD

Now available to everyone. Corporate volume

pricing. Corporate quality standards. At Occidental

we specialize in building advanced, fully featured

computer systems for corporate volume buyers.

This enables us to focus on a fixed profit margin

while delivering absolute quality and perfor-

mance at extremely low prices. Everyone Saves.

447 of America's
top 500 companies have
open account status.



OCCIDENTAL

**What you want. When you want it.
At the price you want to pay.**

DELIVERS!

ONE

pricing available
advantage now.

ES!

These systems are loaded. Features include a great deal of memory. Large fast hard drives. Both floppies. Local bus video. Local bus expansion. 8 open slots and 6 bays. 1024 x 768 VGA color non-interlaced monitors. DOS, Windows and a mouse. And more. Including toll-free access to our Corporate Support Center. Everyone can

take advantage of these corporate volume benefits. Many Oxy™ systems are pre-built. All are built to corporate quality standards. They are **ready to**

ship. Today. If your firm is on our approved credit list, we process on your Fax PO and ship upon receipt of the original. If you're not on our approved list, getting there is easy.

Just call. Small and medium size business buyers are welcome too. As are individuals. Leases are available. Major credit cards are accepted. COD is always an option. Custom orders are also welcome.

Call 800-
525-6543
for details.



OccidentalSystems.
A DIVISION OF OCCIDENTAL CORPORATION
800-525-6543

EVERY

We understand the needs and requirements of corporate computer buyers. Low prices. Top quality. Exceptional performance. Complete compatibility. Prompt delivery. That's what buyers have come to expect from Occidental. And that's what they get. **A no nonsense**

commitment to deliver. Systems that work out of the box. Every time. And they keep working. This leads to high volume. Which leads to **low**

prices. We are not all things to all people. And we don't want to be. But we may very well be all things to you. Because now you can take advantage of corporate volume buying. Of high performance systems loaded with features at very low prices. Whether you want one or one thousand. **We're happy to help.** If you haven't tried Occidental

◀ *Oxy systems include virtually everything you want. Take advantage of corporate volume pricing and corporate quality standards. Most systems ship the same day.*

Systems yet, you should. We are currently building three technologically advanced upgradable platforms featuring Intel's 486SX-25, 486DX-33 and 486DX2-50.

Corporate volume pricing to everyone. Take advantage.

SAVE

Loaded systems. 486DX2-50 \$2495 486SX-25 \$1595 & 486DX-33 \$2195

Take a look at these prices and configurations. We think you will agree with Occidental: Build advanced fully featured computer systems and make them available to everyone at volume discount prices. One or one thousand. Everybody saves, including you! Call now, 800-525-6543.

25MHz 486SX

The Young Turk. A high performance system package. Works hard. Works fast. Upgradable, it can grow with the job.

- ▶ Intel 80486SX 25MHz Processor
- ▶ Intel Upgrade Socket
- ▶ 4MB RAM
- ▶ 170MB 17ms IDE Hard Drive with 32K Cache
- ▶ Local Bus Video, High Performance VGA with 1MB
- ▶ 14" 1024 x 768 NI VGA color monitor
- ▶ 1.2MB 5.25" Drive
- ▶ 1.44MB 3.5" Drive
- ▶ Flash BIOS
- ▶ 8 Open expansion slots (seven ISA and 1 Local Bus)
- ▶ Small footprint chassis, 6 drive bays
- ▶ 1 parallel and 2 serial ports. Integrated
- ▶ TouchType 101-key tactile keyboard
- ▶ High-Resolution Mouse
- ▶ MS DOS 5.0. Factory Installed
- ▶ MS Windows 3.1. Factory Installed
- ▶ Fully compatible. DOS, Novell, Unix, OS/2
- ▶ Ready to Run out of the box
- ▶ Same day shipping available*

\$1595

33MHz 486DX

The Executive. Corporate America's #1 choice for all-round computing power. An exceptional choice.

- ▶ Intel 80486DX 33MHz Processor
- ▶ Intel Upgrade Socket
- ▶ 128K Cache
- ▶ 4MB RAM
- ▶ 240MB 12ms IDE Hard Drive with 128K Cache
- ▶ Local Bus Video, High Performance VGA with 1MB
- ▶ 14" 1024 x 768 NI VGA color monitor
- ▶ 1.2MB 5.25" Drive
- ▶ 1.44MB 3.5" Drive
- ▶ Flash BIOS



▶ **Loaded systems. Same day shipping.**
Low prices. Ready to run out of the box.
Just choose your power platform and call!

- ▶ 8 Open expansion slots (seven ISA and 1 Local Bus)
- ▶ Small footprint chassis, 6 drive bays
- ▶ 1 parallel and 2 serial ports. Integrated
- ▶ TouchType 101-key tactile keyboard
- ▶ High-Resolution Mouse
- ▶ MS DOS 5.0. Factory Installed
- ▶ MS Windows 3.1. Factory Installed
- ▶ Fully compatible. DOS, Novell, Unix, OS/2
- ▶ Ready to Run out of the box
- ▶ Same day shipping available*

\$2195

50MHz 486DX2

The President. A very powerful system that makes short work of large tasks. In charge.

- ▶ Intel 80486DX2 50MHz Processor
- ▶ Intel Upgrade Socket
- ▶ 128K Cache
- ▶ 8MB RAM
- ▶ 240MB 12ms IDE Hard Drive with 128K Cache
- ▶ Local Bus Video, High Performance VGA with 1MB
- ▶ 14" 1024 x 768 NI VGA color monitor
- ▶ 1.2MB 5.25" Drive
- ▶ 1.44MB 3.5" Drive
- ▶ Flash BIOS
- ▶ 8 Open expansion slots (seven ISA and 1 Local Bus).
- ▶ Small footprint chassis, 6 drive bays
- ▶ 1 parallel and 2 serial ports. Integrated
- ▶ TouchType 101-key tactile keyboard
- ▶ High-Resolution Mouse
- ▶ MS DOS 5.0. Factory Installed
- ▶ MS Windows 3.1. Factory Installed
- ▶ Fully compatible. DOS, Novell, Unix, OS/2
- ▶ Ready to Run out of the box
- ▶ Same day shipping available*

\$2495



▶ **Add just \$69.00 to any desktop system and receive the Oxy vertical chassis. Great upgrade. Great price!**

Occidental Service & Support Information:

- ▶ **Oxy Rapid Order Line.** Available to all our customers for prompt order processing. Call 800-525-6543.
- ▶ **Oxy Satisfaction Line.** A direct line for any questions you may have after your order is placed.
- ▶ **Oxy Bulletin Board Line.** On-line BBS support for questions, software drivers, updates and the like.
- ▶ **30-day money-back guarantee.** One full year limited warranty. Prompt parts replacement. Optional on-site service plans tailored to your needs.

So why not join buyers nationwide! Put a genuine Occidental system on your desk today. Systems featured here are available for immediate shipment. Custom systems take slightly longer.

Call now toll free:
800-525-6543

Fax 612-486-0019
M-F 7AM-9PM (Central)
Saturday 9AM-1PM (Central)

OccidentalSystems.
A DIVISION OF OCCIDENTAL CORPORATION

© 1992. All prices and delivery subject to change without notice.
*Please call to confirm current pricing and availability. All orders subject to payment method approval. Occidental and Oxy are trademarks of Occidental Corporation. All other brands and product names are trademarks or registered trademarks of their respective companies.
Occidental Systems, 3771 Lexington Avenue North, St. Paul, Minnesota 55126. 612-486-0020

Circle 155 on reader service card.

VGA-to-NTSC Boards

Everex Systems Inc.

Everex Vision VGA with Overlay

BY ROBERT KENDALL

The \$855 Everex Vision VGA with Overlay, from Everex Systems, comes with 512K of display RAM and a robust set of overlay and scan conversion functions; our test configuration included 1MB of RAM, bringing the total to \$895. The VESA-compliant Super VGA card provides commendable low-flicker NTSC output, but its genlocking performance marred an otherwise solid record.

Installing the Vision VGA was remarkably simple. A single 25-pin port on the board handles all video input and output. Four cables sprout from the supplied connector that plugs into this port: composite video in and out and S-video in and out. A standard VGA or multiscanning monitor plugs into the VGA port and runs simultaneously with the NTSC monitor.

Unfortunately, the S-video input is of limited value. The board ignores the chrominance part of an incoming color signal, outputting the picture in black and white.

The Vision VGA's on-board VGA supports a number of Super VGA resolutions. It handles 256 simultaneous colors at all standard resolutions up to 1,024-by-

768, and 16 simultaneous colors at 1,280-by-1,024. The board demonstrated solid performance on our Graphics Winmark test; its score of 1.48 million was the fastest of this roundup. Close behind the Vision VGA was the Truevision Video-VGA, which also employs a Tseng ET4000 chip running at 16 bits.

NO FLICKER, AND LOTS OF FEATURES

One of the Vision VGA's most attractive features is its anti-flicker filter, which allows an exceptionally stable and clear NTSC image when the board is converting a VGA signal. The amount of flicker was so minimal that even the contents of an Excel spreadsheet were quite legible on the NTSC screen.

The controller software gives you access to a good range of features, but it is awkward to use since it consists of a lot of separate executable files with arcane names. Most of the features are available either from menus or TSR hotkeys, however. The TSR takes up only 8K of memory.

You can center the picture horizontally or vertically, and there is an overscan mode. The underscan mode compresses the VGA image horizontally to fit on the screen, though as with most of the products, there is unfortunately no vertical compression option to ensure that the top and bottom of your image won't be cut off.

The software interface lets you use your mouse to adjust sliders for setting the contrast, brightness, saturation, and hue of an incoming NTSC signal. As you move the sliders, these elements change in the video that's output to the NTSC monitor.

This same interface lets you click on color boxes to choose the key color for overlaying. You are able to select from only 16 colors, but you have the unusual ability to engage up to 16 key colors at the same time, all of which become transparent.

GENLOCKING PROBLEMS

One area where the board slipped was genlocking, which was not always as stable as it should have been. In genlock mode, the top of the VGA image often exhibited a pronounced jitter and appeared skewed on the NTSC monitor. Turning off the anti-jitter filter only



EVEREX VISION VGA WITH OVERLAY

served to make the problem worse.

When NTSC input was stopped with genlocking still on, part of the image on the VGA monitor became nearly unreadable until we disengaged the genlocking, or turned off or unplugged the VCR.

The Vision VGA turned in some dubious results on our tests. Its scores on the Noise-F and Noise-G tests were among the poorest of this roundup: -48.8 dB RMS and -48.0 dB RMS, respectively. It also recorded the second-lowest Gain result, though there was no corresponding reduction in image brightness in practice. On our High-Frequency Response tests, the board's performance worsened as the frequency increased, exceeding the acceptable range at 2.0 MHz. In addition, it exhibited unacceptable characteristics for both the Subcarrier Horizontal Phase and Phase Shift tests; its score on the former was -53.0 degrees, and the signal output for the Phase Shift test was too unstable for this board to produce an accurate result.

Another drawback is that there's no way to display only the NTSC output on the NTSC monitor. There will undoubtedly be times when you won't want your video image encumbered by the DOS prompt or the interface of whatever controller software is running. The only way to hide them is to select all the colors of the interface as key colors.

Unlike many of its competitors, the Vision VGA comes with no software for creating titles to overlay onto your video. The documentation is also a little skimpy at times.

The Everex Vision VGA with Overlay's low-flicker NTSC output makes it stand out from much of the competition, especially for putting elaborate presentations or animations onto videotape. And the \$569 street price (or \$599 with 1MB of RAM) is attractive. But the board's shaky genlocking performance and poor results on our tests detract from its appeal and are probably reasons enough for you to look elsewhere.

▶ FACT FILE

Everex Vision VGA with Overlay

Everex Systems Inc., 48431 Milmont Dr.,
Fremont, CA 94538; 510-683-2100;
fax, 510-651-0728

List Price: With 16-bit ISA board with 1MB DRAM, DOS control utilities, composite and S-video cables, \$895.

Requires: Standard VGA or multiscanning monitor, NTSC video monitor.

In Short: The Everex Vision VGA with Overlay provides on-board Super VGA and produces a low-flicker NTSC image from VGA graphics. The Everex experienced problems with genlocking during our testing, however, and the board also produced poor scores on some of PC Magazine Labs' benchmark tests. Though its \$599 street price is enticing, you can find better products out there.



ON READER SERVICE CARD

VGA-to-NTSC Boards

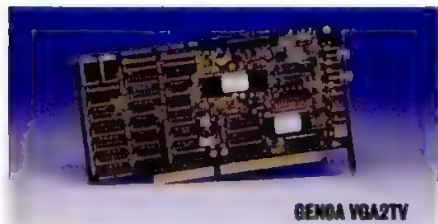
Genoa Systems Corp.

Genoa VGA2TV

BY JOHN R. QUAIN

Intended as a basic VGA-to-NTSC solution, the \$499 Genoa VGA2TV performs the rudimentary tasks of genlocking VGA and NTSC signals. But as you might expect from the low price, its performance is also a bit rudimentary.

Outfitted with a 512K frame buffer, the internal 16-bit board can accept NTSC and S-video inputs and outputs us-



GENOA VGA2TV

ing RCA jacks and standard S-video connections. The ports are conveniently marked on the back of the card, and when two composite-video sources are connected, the VGA2TV defaults to the S-video source.

Similar to several more expensive offerings, the VGA2TV is not equipped with on-board VGA. Instead, Genoa supplies a pass-through VESA feature connector cable to connect your VGA adapter and card. To set the board properly, you need to connect the VGA2TV to an NTSC-compatible monitor to view the live video picture and VGA overlays.

For creating titles and captions,

▶ FACT FILE

Genoa VGA2TV

Genoa Systems Corp., 75 E. Trimble Rd.,
San Jose, CA 95131; 408-432-9123;
fax, 408-434-0997

List Price: With 16-bit ISA board; DOS control utilities; composite, S-video, VGA pass-through cables; Video Titler, \$499.

Requires: Standard VGA or multiscanning monitor, NTSC video monitor, VGA or Super VGA board.

In Short: The Genoa VGA2TV is an unimpressive performer with an attractive price tag. Only those looking for basic VGA-to-NTSC functionality should consider this product.



ON READER SERVICE CARD

Genoa Systems Corp. includes Entropy Engineering's Video Titler software. Aside from that, the remaining software controls are primitive. A tiny DOS TSR utility (about 2K in size) lets users select from among 256 key colors for overlays (8-bit, 4-bit, or 1-bit settings) and select the video output mode. The VGA2TV will output composite NTSC video and S-video, superimpose VGA graphics on the live video, or convert a 256-color VGA signal to recordable NTSC output. There are no additional effects or positioning controls.

The VGA2TV's composite NTSC output was not stable enough to produce a Subcarrier Horizontal Phase or Phase Shift measurement. These two results usually indicate a board's color fidelity. (The lack of stability here was not unique among the products we tested.) During our hands-on evaluation, there appeared to be some loss of color saturation, particularly in the reds and yellows of superimposed graphics.

The rest of the VGA2TV's performance did not improve its standing. On our video-signal noise tests, it was the worst performer in non-genlocked mode and didn't do much better, in comparison with the competition, with its overlay mode enabled. Superimposed Windows graphics suffered from jitter and flicker. These results may be due in part to a slight signal boost, which was indicated by PC Magazine Labs' Gain test.

High-frequency response, a sign of the adapter's NTSC resolution, showed the most precipitous drop of any of the tested boards at the 2.0-MHz mark. Signal loss rose to -16.75 dB at that point. The board did somewhat better at the higher 3.0-MHz and 4.1-MHz points, but the sharp dip at 2.0 MHz indicates that some perceptible image detail will be lost.

The Genoa VGA2TV includes RCA, S-video, and VGA pass-through cables. The product's below-par performance won't attract many serious videographers, but its low price may entice a few users who are just looking to experiment.

Magni Systems Inc.

Magni VGA Producer Pro

BY JOHN R. QUAIN

A former PC Magazine Editor's Choice, the \$1,995 Magni VGA Producer Pro has managed to maintain its lead in terms of image quality and performance—and high price. Though Magni Systems has changed it slightly, this product is still expensive and tricky to use, requiring some practice before you will feel comfortable with all of its features. Once you are, you'll find a wealth of options at your fingertips.

The package includes a full-length 8-bit ISA board with

1MB of field RAM and an external control box. Installation still isn't as smooth as it could be, but Magni has eliminated the costly and awkward optional connectors we criticized in the past. The anti-flicker feature is now standard (the VGA Producer Pro previously cost an additional \$195 with the stabilizer), and it no longer requires the delicate RAMDAC connector. There are several jumpers and adjustment dials on the board in case you run into conflicts. We didn't.

On-board VGA is not included, but Magni supplies a feature connector cable to pass VGA signals through from your existing adapter.

The anti-jitter and anti-flicker filters make for a pretty stable interlaced picture. The VGA Producer Pro will output the equivalent of 768-by-480 graphics with 256 simultaneous colors for composite-video recording and display.

There are S-video in and out jacks on the expansion card's back, as well as a BNC breakout adapter. The adapter handles composite-video input and output, graphics output, and key out. It can also send the S-video signal's luminance and chrominance portions out separately.

HARDWARE CONTROL

Smaller than a paperback book, the VGA Producer Pro's external control

*With the Genoa VGA2TV,
there appeared to be
some loss of color
saturation, particularly
in the reds and yellows
of superimposed graphics.*

HARDWARE
VGA-to-NTSC Boards



MAGNI VGA PRODUCER PRO

box lets you manipulate key colors, cuts, mixes, pans, zooms, and cross-fades between composite and VGA video without running additional software. Using the controls take some practice. You must master various slider and button combinations to create certain effects. Indeed, some combinations are so abstruse that the company devotes half of its user manual to describing each function step by step.

If you're patient enough to follow the instructions (and the control box's flashing LEDs), you can make precise modifications, including vertical and horizontal positioning, fade-rate adjustment, and panning settings. In addition, a setup utility enables users to make many of these changes via on-screen menus—preferable for those of us who have trouble remembering key combinations. Once an optimum setting has been established, you can store the settings to a configuration file for easy recall.

On our tests, the VGA Producer Pro was by far the most proficient performer of this group. It introduced the least amount of noise in our non-genlocked

NTSC test (-62.3 dB RMS) and the second-least amount of video noise (-61.5 dB) with genlocking enabled (only the Truevision VideoVGA was better in this regard).

Signal gain was up slightly, above 100 IRE units. This was an impressive result, given the excellent noise measurements. The Magni VGA Producer Pro's high-frequency response also was the strongest of the tested group, with no appreciable loss detected even up to 4.1 MHz. Most users shouldn't perceive any loss of

***On our tests, the Magni
VGA Producer Pro was by
far the most proficient
performer of this group.
Its high-frequency
response was the strongest
of the group.***

brightness on NTSC displays.

Editing and effects tests revealed no significant overscan or color saturation problems. The Tektronix equipment did detect some slight color skewing, however.

The VGA Producer Pro demonstrated superb genlocking talents. Its on-board sync generator and anti-flicker circuit delivered about as good an image as one could hope for. Video editing effects worked well, and fades and other transitions were smooth. If you had to use just an interlaced NTSC monitor and still be able to read text in Windows, this is possibly the only tested board that could let you do this.

Extensive DOS software is bundled with the Magni VGA Producer Pro. It too requires more than simple "run" or "install" commands to set up, but it rewards patient users. A professional-strength character-generation package, Shereff Systems' Pro Video VGA-16, was included with our system, as is Magni's VGA Director, which enables you to create scripts and manage .PCX and AutoDesk Animator files. Also bundled with the VGA Producer Pro

Freed and Derfler Bridge the Communications Gap.



ISBN: 1-56276-037-8
Price \$29.95

If all the technological advances and new products have you wondering what's really worth your time and money, bridge your communications gap with *PC Magazine Guide to Modem Communications*. Whatever your budget, whatever your technical know-how, whatever your present equipment—Les Freed and Frank J. Derfler, Jr., have the answers. They've worked with and tested just about every known hardware option, software product, and on-line service.

Available
at fine
bookstores,
or call
1-800-688-0448
ext. 1214



© 1992 Ziff-Davis Press

PC
MAGAZINE
FACT FILE

Magni VGA Producer Pro

Magni Systems Inc., 9500 SW Gemini Dr.,
Beaverton, OR 97005; 800-624-6465,
503-626-8400; fax, 503-626-6225

List Price: With 8-bit ISA board with 1MB RAM, external control box, VGA pass-through connector, breakout cable, DOS control utilities, Disney Presents the Animation Studio, Pro Video VGA 16, VGA Director, \$1,995.

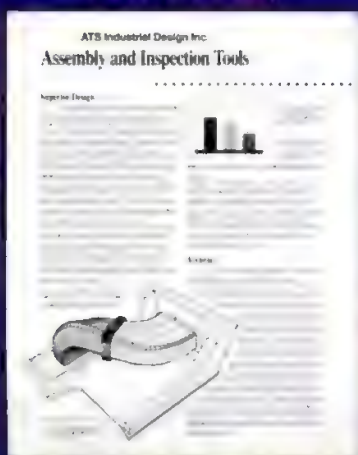
Requires: Standard VGA or multiscanning monitor, NTSC video monitor, VGA or Super VGA board.

In Short: Outperforming the competition on PC Magazine Labs' tests, the Magni VGA Producer Pro is intended for serious professionals. And with a list price of nearly \$2,000, only serious users need apply. For the price, though, you get a host of features that once mastered will provide you with maximum control.

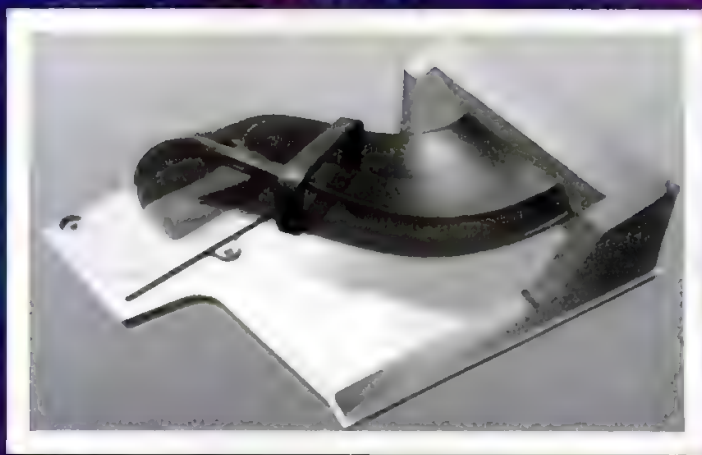


All the benefits On a much

A size (8.5 x 11")



B size (11" x 17")



At last. A personal output device that combines the best features of a desktop laser printer with the ability to produce large C-size drawings. It's called ProTracer™ — a monochrome inkjet printer/plotter designed for the personal use of PC CAD professionals.

MEDIA FLEXIBILITY

ProTracer is a desktop printer/plotter that lets you produce A, B, as well as large C-size output. It prints sharp, precise lines on a variety of media including plain and bond paper, plotter paper, and most vellum.

SPEED

ProTracer is fast and quiet because it uses the latest Canon inkjet technology and an Intel i960™ processor. Just compare it to any other large format plotter and

you'll see. A complex C-size drawing often takes over half an hour on a pen plotter, while ProTracer completes the same drawing in as little as five minutes!

HIGH QUALITY OUTPUT

ProTracer achieves its high quality output by utilizing a 64 nozzle printhead to deliver crisp lines and bold, high contrast blacks. Its 360 dpi resolution assures sharp lines needed for everything from the most complex engineering drawings to sophisticated text and graphics used in letters and reports.

VERSATILE AND EXPANDABLE

Unlike other large format devices, ProTracer isn't limited to plotting. Instead, it can produce high quality finished output for a variety of applications including word processing, spreadsheets, and desktop

C size (17" x 22")



**FIRST RATE
CUSTOMER SERVICE**

At Pacific Data Products, we're well known for our devotion to customer service. We offer a **60-day money back guarantee of satisfaction**, one year and optional extended warranties, and free lifetime technical support. Should you require a replacement unit while under warranty, one will be rushed to you immediately to minimize your downtime.

If you'd like to expand your personal printing and plotting capabilities, call Pacific Data Products at (619) 597-4628, Fax (619) 552-0889.

**PROTRACER
FULLY CONFIDENTIAL**

- ProTracer base unit
- HP-GI emulation card
- PostScript language emulation card
- 5 MB memory*
- Sheet feeder (100 sheet)

\$2897

**PACIFIC DATA
PRODUCTS**

Four reasons to buy a TI microLaser™ printer.



Now there's a way for you to put the power of Microsoft® Windows™ on paper — microLaser from Texas Instruments.

Designed to be Windows-compatible, there's a microLaser just right for your needs, whether you need a personal or shared printer. Here's why:

1. Compatibility With HP LaserJet® emulation and Adobe® PostScript® software, microLaser easily supports your demanding applications. And with our Microsoft Windows driver, set it and forget it with all Windows applications.

Not only does PostScript give you scalable outline fonts and graphics, it also means that your microLaser works in computing

environments like Windows, DOS®, Apple® Macintosh®, OS/2® and UNIX®.

2. Performance When it comes to printing high-quality documents fast, microLaser really makes you look good. At either nine or 16 pages-per-minute, microLaser printers speed you through documents in a hurry. Plus PostScript means what you see on your screen is what you get on paper. You can even turbocharge your microLaser with a RISC processor for blazing fast graphics.

3. Reliability When you buy a printer, you want it to print. And print. And print. That's just what the microLaser does.

Take our personal microLaser Plus for

example. With its high duty cycle of 10,000 pages-per-month* and a standard one-year limited warranty**, you can rely on your microLaser to work the first time, every time, for years.

4. Value Starting as low as \$999†, there's a microLaser designed to fit any budget. From the single user all the way up to a network. Consider this, too: microLaser's average cost per page is only 1.9 cents‡, while some laser printers average around 3.3 cents. The microLaser not only makes sense, it saves you money, too.

For details on the right microLaser for you and the name of the nearest dealer, call

1-800-527-3500.

The microLaser PS17 has earned the 1990 PC World Best Buy award; microLaser PS35 has earned the 1990 InfoWorld Excellence Value award and 4½ price from MacUser, October 1990.

Features	microLaser Plus Basic	microLaser Plus PS17/PS35	microLaser Turbo	microLaser XL Turbo
PPM	9 ppm	9 ppm	9 ppm	16 ppm
Emulation	HP LaserJet II	HPLJII/PostScript	HPLJII/PostScript II	HPLJII/PostScript II
Processor	68000	68000	RISC/8220	RISC/8220
Fonts	14 HP Fonts	17 or 35 Scalable	35 Scalable	35 Scalable
List Price	\$999	\$1,399/\$1,499	\$1,749	\$3,649

*Based on estimated typical usage. **For more information on service upgrade options, call 1-800-847-5757 in the U.S. and 1-800-268-6314 in Canada. †Suggested retail price — dealer prices may vary. ‡Based on suggested retail price of consumables and approximate page coverage rating for each consumable at 4% black (letter, developer and OPC). microLaser is a trademark of Texas Instruments Incorporated. Microsoft and DOS are registered trademarks, and Windows is a trademark of Microsoft Corporation. Adobe, PostScript and the PostScript logo are registered trademarks of Adobe Systems Incorporated which may be registered in certain jurisdictions. LaserJet is a registered trademark of Hewlett-Packard, Inc. Apple and Macintosh are registered trademarks of Apple Computer, Inc. OS/2 is a registered trademark of International Business Machines Corporation. UNIX is a registered trademark of AT&T. ©1992 TI 76943.

VGA-to-NTSC Boards

package is Disney Presents the Animation Studio, a useful if often frustrating package; by the time you read this, the company will instead include InnoVision Software's Prime Time.

Of the VGA-to-NTSC products reviewed in this issue, this adapter is most clearly aimed at desktop-video professionals and the one best suited to meet their high-end needs. The Magni VGA Producer Pro accepts, for example, separate sync and if necessary allows the horizontal timing to be adjusted for a professional video switcher. Magni offers an MCA version of this board for \$2,495, and a PAL version costs \$2,595. Since this is a high-end item, don't expect discounts of more than about 10 percent.

Truevision Inc.

Truevision VideoVGA

BY JOHN R. QUAIN

Truevision is a familiar name to graphics and DTP professionals. Through its Targa Plus products, this company has established a strong reputation in the field; and it seems that Truevision is on its way to continuing the trend with the Truevision VideoVGA. The \$995 Video-



TRUEVISION VIDEOVGA

VGA, which combines solid NTSC genlocking skills with an on-board VGA controller, is a reasonably priced single-slot video solution.

The internal VGA-to-NTSC adapter comes standard with 512K of DRAM, and a Tseng ET4000 VGA controller capable of a maximum noninterlaced resolution of 800-by-600 with a 60-Hz vertical refresh rate and 256 simultaneous colors. We tested a version of the VideoVGA with 1MB of RAM, which raised the price of the adapter to \$1,195.

The on-board VGA controller performed as expected, producing an excellent Graphics Winmark result that was second only to that turned in by the Everex Vision VGA with Overlay.

Although the full-length board's ISA

ATTENTION 386 USERS
RUN SOFTWARE UP TO
3 TIMES FASTER

REAL CYRIX UNREAL PRICES.

Now get PC Week's "Top Rated" FasMath™ coprocessor for 386SX or 386DX PCs at a bargain price.

FASMath 83S87 MATH CHIP FOR ALL 386SX PCs

Now \$79*

Cyrix FasMath has won every comparative PC publication review ever held for math coprocessors.

Available at computer dealers everywhere. Or call 1-800-FAS-MATH.

*83S87 -33 for
386SX33PC: \$99

*83D87-40 for
386DX40 PC, \$129

Cyrix
ADVANCING THE FRONTIER

TOP RATED
PC WEEK
LABS

AUG. 27, 1990

1991
BYTE
AWARD
TOP
DISTINCTION

COMPUTER
Best
Performance
SHOPPER

FASMath 83D87 MATH CHIP FOR ALL 386DX PCs

Now \$99**



MicroWAREHOUSE is the leading source for all your Windows needs! You can depend on us for fast, reliable, overnight service!

★ Domestic Windows Compatible Products



PackRat 4.0

New PackRat 4.0 manages the details while you focus on the opportunities. PackRat is a powerful, intuitive personal information manager (PIM) that flexibly handles your phone book, calendar, to-do's, projects, autodialing, hard disk files, finances, reminders, free-form notes and much more. Schedule repetitive meetings, check for conflicts, set alerts to remind you of your meetings, and print out attractive calendars. Store multiple addresses and phone numbers and extensive notes on your contacts. SmartButtons let you customize PackRat to work the way you work. Seamlessly exchange information with Word for Windows, Ami Pro and Excel. PC Magazine's Editors' Choice. Also available, **PackRat 4.0 for Networks BS2934 \$429**. Publisher: Polaris **PackRat 4.0 BS2894**

\$259



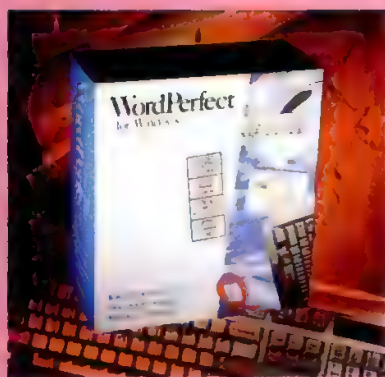
The Animation Studio

Create fluid, incredibly rich (over 250,000 colors!) animations that can bring your drawings to life - or provide your on-screen demos with dazzling impact. The Animation Studio is not just a full-featured animation and paint program that provides you with cel animation techniques unique to Disney-style animation - it's also a tutorial. Utilizing such tools as onion skin technology, exposure sheet timing, and ink and paint make it easy to create smooth-flowing animation. Four disks come packed with sample animations, sound effects, basic and advanced techniques tutorial, and other tools. Requires a mouse and 640K of memory.

Publisher: Walt Disney Computer Software
GR5174



\$75



WordPerfect® 5.1 for Windows™

WordPerfect 5.1 for Windows contains all of the capabilities of WordPerfect 5.1 for DOS, as well as new features that take full advantage of the Windows graphical user interface. The Ruler simplifies the tasks of adjusting margins, setting tabs, changing line spacing, selecting styles and creating or modifying columns and tables. WYSIWYG editing lets you see all your graphics and fonts on screen. Graphics can easily be moved and sized by using the mouse. You can assign frequently used features and commands to the Button Bar for easy access. WordPerfect for Windows documents are compatible with WordPerfect 5.1 for DOS. Publisher: WordPerfect Corporation
WP1653/5

\$295



PC Paintbrush 5+

The Choice of Millions... With over 5 million users, PC Paintbrush has become the standard by which others are measured for paint and image processing. Now, PC Paintbrush 5+ raises the standard to new heights. It's a DOS color/gray scale image editor used for creating, scanning, and editing images. PC Paintbrush 5+ Combines award-winning paint tools with powerful image enhancement capabilities in one easy-to-use program. Publisher: ZSoft GR0634

\$99



SuperStor 2.0

SuperStor advances data compression with release 2.0! With the largest installed base world-wide, SuperStor instantly and transparently increases disk capacity by two or more times. Advanced features include: Highest Compression Ratios of any data compression software! (up to 25% greater than version 1.3). Universal Data Exchange allows compressed floppies or removable media to be read and saved by any other DOS-based PC, even if SuperStor isn't installed on it! Device Driver now Easily Loads High with memory manager present! Speed enhancing Disk Cache improves overall performance! Defragmenter optimizes compressed disks! Runs with all software. Publisher: Addstor UT2194

\$69

PC Globe 5.0

PC Globe is a colorful world tour you don't have to leave your desk for. The ideal resource for educators, business people, students, travelers, providing users with instant profiles of 208 countries and dependencies in a single, simple-to-use source. Features include: Topographical and natural features maps. Demographic, economic, political, climate and health data. Travel requirements, tourist attractions, currency conversions. Country comparisons on charts or maps. Easily exported and printed. Now includes Yugoslav Federation, Croatia, Slovenia, Commonwealth of Independent States (C.I.S.), Baltic States and Georgia. Publisher: PC Globe BS1834



\$37

Bridge 7.0

The way to Better Bridge

You may have other bridge programs, but this is the one you will play the most! Features all new bidding and play logic, hi-res card graphics, mouse or keyboard input, hint mode with explanations, take back bid or play, choose bidding styles for partner and opponents, digitized speech, edit and swap hands, and much more. Play contract or duplicate bridge, or the game that started it all, whist! Publisher: Artwork EN3113/5



\$35



★ CorelDRAW! 3.0

A new Era in PC Graphics! CorelDRAW, winner of over 50 international awards, is the PC graphics software for everyone! CorelDRAW 3.0's enhanced features include graphic design layers; editable preview; improved 3D effects; and powerful data-driven charting, paint and photo editing, and presentation packages: CorelCHART, Corel PHOTO-PAINT, and CorelSHOW. It comes with 153 TrueType fonts, and over 4600 symbols and clip art images. And as an unprecedented bonus, Corel has included a CD-ROM with over 12,000 clip art images and over 250 fonts! Also included: dozens of fill patterns, dotted and dashed line styles, and arrowheads, 31 import/export filters, free Pantone and TRU MATCH licenses, and free utility programs - CorelTRACE and Mosaic. Also Available on CD ROM. CD0220 \$445. Publisher: Corel Systems

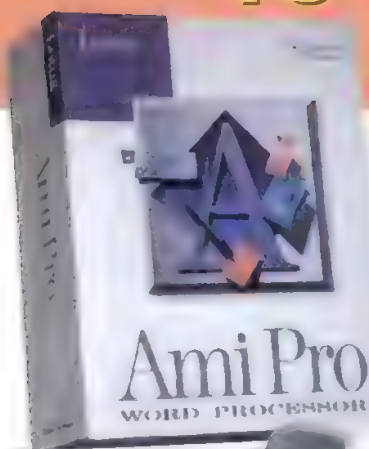
GR5443

\$379



Upgrade To Windows 3.1 for only \$39

**Upgrade
Overnight!**



Ami Pro 3.0 "stands unchallenged as the most powerful and enjoyable Windows word processor."

— PC Magazine

or purchase
Ami Pro 3.0
and get the Windows 3.1
Upgrade **FREE!**

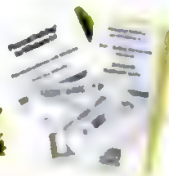
Without a doubt, Ami Pro 3.0 is the best designed word processor for Windows. Colorful, customizable and truly functional SmartIcons let you access Ami Pro functions with one-click ease. Ami Pro brings you the power and innovation that other Windows word processors only dream of. Includes **FREE** Windows 3.1 Upgrade for a limited time. Order now!

Publisher: Lotus Development Corp. BN0953/5 \$249

Also available: Ami Pro 3.0 Upgrade (Windows 3.1 not included) SI0424 \$99

FREE! Windows 3.1 Tutorial

FREE!* Make Windows even easier with this Personal Training Systems tutorial. It's like having an expert sit beside you. It's **FREE** with **ANY ORDER** from MicroWarehouse. Ask for item #AA0004 when you place your order. *\$2.00 shipping charge applies.



Upgrade packaging for Windows 3.0 not shown. Proof of ownership required for upgrade. Call for details. Overnight delivery is \$* with faxed proof of ownership.

Discover the point-and-click graphic simplicity of Microsoft Windows 3.1, and using your PC will never be easier. Create terrific looking documents in less time. Sail through your work more easily. Share information between DOS and Windows applications. Experience the Windows environment, and you'll never want to leave.

Windows 3.1 Full Version\$89
Ami Pro 3.0 for Windows with Windows 3.1 Full Version
BN0980\$298

Aldus IntelliDraw

Aldus IntelliDraw defines an exciting new category of drawing program, with intelligent features that give you an easy new way to visually experiment, refine, and draw your ideas. Innovative smart tools link graphics in your drawing so they respond to changes automatically. Create visual "what-if" scenarios with features like intelligent clip art & templates, automatic symmetrical objects, and dimension lines. Auto-alignment, shape blending, powerful text handling capabilities, unlimited layers, color gradients, standard draw tools and more.

Publisher: Aldus GR5383

\$199

DesktopTV

DesktopTV enables you to watch video on your PC screen. It's like having a television set on your desk. You can watch live video from a video camera, or from a video cassette. You can also watch video from a VCR, or from a video disc. The video is displayed on your PC screen, and you can control it with your mouse. DesktopTV is a powerful tool for watching video on your PC. It's easy to use, and it's powerful. You can watch video from a video camera, or from a video cassette. You can also watch video from a VCR, or from a video disc. The video is displayed on your PC screen, and you can control it with your mouse. DesktopTV is a powerful tool for watching video on your PC. It's easy to use, and it's powerful.

\$249



ImagePals

ImagePals is a set of integrated programs for managing your image files. It's easy to use, and it's powerful. You can manage your image files, and you can also manage your image files. ImagePals is a powerful tool for managing your image files. It's easy to use, and it's powerful.

Publisher: U-lead GR5104

\$169



Call for
Overnight
Upgrades!

I'm Kerry, call me at:

MicroWAREHOUSE®
1-800-367-7080

(1-800-DOS-7080)

Inquiries: 908-370-0518 Fax#: 908-905-5245

Order Toll-Free 24 Hours a Day, 7 Days a Week

Free Micro Warehouse Catalog Subscription

2PM092

1690 Oak Street, P.O. Box 3014, Lakewood, N.J. 08701-3014

Fill out and mail this coupon to receive a free, one-year subscription to the MicroWarehouse catalog.

Name _____

Address _____ Apt. _____

City _____ State _____ Zip _____

(Expect to receive your next issue within 4-6 weeks)

CIRCLE 225 ON READER SERVICE CARD

Item numbers ending in 3 and 5 denote products available in 3 1/2" and 5 1/4" formats respectively. Item numbers ending in 4 denote that both formats are included. Please refer to item numbers when ordering.

- ★ Windows-compatible products
- ◆ Call for available upgrades

COMPUTERS & MEMORY

Cardinal	PC10 386SX/16	899
Leading Edge		
BN0900	386SX 20MHz w/Color Monitor	1099
BN0510	486 20MHz VGA Bundle	1749
CP0250	Color Notebook 60MB	2699
Memory		
	SIPPS, SIMMS, DRAMS	Call
MY0010	SIMM 256K 100ns	21
MY0013	SIMM 1MB 100ns	49
MY0005	SIMM 1MB 70ns	59
MY0004	SIMM 1MB 80ns	55

EXPANSION & UPGRADES

ATI Technologies		
EX2020	ATI 8514 Ultra MB	399
EX2010	VGA Stereo FX	269
Avion		
EX1940	Desktop TV VG1	249
Boca Research		
EX1840	BRAT90 with 8K	115
Brown - Waugh		
EX1510	MIDI Connector for SoundBlaster	59
EN0910	Sound Blaster	99
EX1800	Sound Blaster Pro	189
Digital Vision		
EX1195	ComputerEyes Prof. Series	299
EX1610	ComputerEyes Color/RT	519
Media Vision		
CD0320	Multi Media PC Upgrade Kit	799
IN2550	ProAudio Spectrum 16	229
Persona Technologies		
EX0260	PC Speakers	179
EX2310	PC Micro Speakers	65
Stac Electronics		
EX1484	Slackert 2.0	99
Visioneer		
EX1940	DesktopTV	249

MEDIA & ACCESSORIES

Disks (boxes of 10)		
	BASF, Sony, Maxell and bulk Fuji	Call
Kamimation		
AC0140	Masterpiece Plus	95
Targus		
AC2340	Premier Leather Case	169
AC0670	Universal Notebook Case	66

DRIVES/CD ROM

Iomega		
DR1970	Bernoulli 90MB Transportable	669
DR2240	Bernoulli PC Powered	539
Micro Solutions		
DR1310	backpack 1.4	210
DR1790	backpack 2.8	249
Plus Development		
DR1250	HardCard II XL 105 MB	399
Teac		
DR0910	Teac 3.5 1.44 FD	75

PRINTERS & CARTRIDGES

Adobe		
BN0080/70	Adobe PostScript Cartridge with Type Cartridge 1 and 2	299ea
	★ ATM Plus Pack	125
Canon		
PR1710	Auto Sheet Feeder for BJ-10e	72
PR1500/10	Bubble Jet BJ-10ex	325
PR2240	Bubble Jet BJ - 300	459
Citizen		
PR2201	GSX-140 Plus Color Printer	339
Pacific Data Products		
PR1120	25 Cartridges in One!	269
PR0910	Pacific 4 Memory w/2MB	125
PR0490	PacificPage w/1.2 & 4 Plus 2MB	375
Panasonic		
PR2200	KK-P1124i Printer	299
PR2190	KK-P2624 Silent	419

MODEMS & FAX BOARDS

Cardinal		
MM0520	Internal 2400 Bd. Modem	49

MM0870	Int. 2400 Bd. Modem w/6900 Send/Rcv. Fax	95
MM0070	Int. 9600 Bd. Modem w/42 BIS, MNP 269	
Hayes		
MM1930	OPTIMA 96 V.32	369
MM2100	OPTIMA 144 + FAX144	479
MM0810	Pocket Edition 2400	119
MM0210	Ultra SmartModem 9600 V.32	629
MM0860	Ultra 144 V.32 BIS, Ext.	899

Practical Peripherals		
MM2100	Practical Mod. 14400FAX V.32BIS Ext. SAR19	
The Complete PC		
FX0060	The Complete Communicator	299
FX0040	The Complete Fax/9624	245
Zoom Telephonics		
MM1210	AFX Ext. 9600/4800 S/R Fax	85
MM0910	Fax/Modem FX 9624 S/R Ext.	105
MM1000	9624 S/R Int. w/ WINFAX Bundle	119
MM2140	VFX V.32 BIS Ext. 14400 S/R Fax	309

NETWORKING

3-Com		
NT0060	Etherlink II-Single User	199.
Artisoft		
NT0110	Lantastic 2 MBPS Adapter Card	149

INPUT DEVICES

ApPOINT		
IN2130	MousePen Professional	65
IN2260	Thumbelina	69
Caere		
IN2314	★The Typist Plus Graphics (AT)	389
Logitech		
IN1070	Scanman 256	269
IN2250	Trackman Portable	99
Microsoft		
IN2150	Ballpoint Mouse	119
IN0890/80	Mouse (bus/ser)	85
IN0275/84	★ Mouse w/Windows (bus/ser)	145
MicroTouch Systems		
IN0810	The UnMouse	165.
The Complete PC		
IN2110	Complete Page Scanner w/ WordScan OCR Software	569
Z-NIX		
IN2683/5	★ SuperMouse II (ser) w/Win 3.1	75

MONITORS

Various		
MT0280	PanaSync C1381 14" VGA Color	369
MT0320	Sammron Super VGA Color	329

ENTERTAINMENT & EDUCATION

Abrecedata		
FN2694	Design Your Own Home, Architecture	33
Artworx		
EN3113/5	Bridge 7.0	35
Broderbund		
EN0734	SimCity	29
ED0184	Where in the USA is Carmen SanDiego	32
Microsoft		
EN1473/5	★ Entertainment Pack	29
EN0043/5	★ Flight Simulator 4.0	38
Personal Training Systems		
ED3310	★ WordPerfect 5.1 Beginning	49
ED3563	★ EXCEL 4.0 Beginning Spreadsheets	49

DESKTOP PUBLISHING & GRAPHICS

Adobe		
	Adobe Fonts (various)	Call
PR1594	★ Adobe Type Manager	59
GR2094	★ TypeAlign	65
GR5143/5	★ Illustrator 4.0 for Windows	389
Aldus		
GR3043/5	★ Aldus FreeHand	389
GR5034	★ Aldus PhotoStyler	529
GR5294	★ Aldus Gallery Effects	139
GR5383	★ Aldus IntelliDraw	199
GR2053/5	★ PageMaker 4.0	469
GR5013/5	★ Persuasion 2.1	330
Altays		
GR1543	★ Photographer for Windows	265
Application Techniques		
GR2134	★ PictureEase 2.0	95
Ares Software		
GR3074	★ FontMonger for Windows	89
Berkeley Systems		
GR1994	★ After Dark 2.0 for Windows	29
Broderbund		
DR2894	New Printshop	39
Calix		
GR2064	★ WordScan	189
GR2114	★ WordScan Plus	429

Computer Associates		
GR1214	CA Cricket Graph 1.3	85
Corel Systems		
GR5443/5	★ CorelDRAW! 3.0	379.
Fractal Design Corp.		
GR5344	★ Painter	319.

Micrografix		
GR2783/5	★ Micrografix Designer 3.1	379
GR2833/5	★ Windows Draw!	99
GR5263/5	★ Picture Publisher with Color Scanner	569
Microsoft		
BS2304	★ Powerpoint for Windows	315
GR3144	★ Microsoft Publisher for Windows	129

New Vision Technology		
GR3174	★ Presentation Task Force CGM 4.0	134.
Ocrn		
GR2194	★ Perceive Personal 2.0 for DOS & Win.	185.
GR2184	★ Perceive 2.0	119.

Software Publishing		
GR2033/5	★ Harvard Graphics 3.0	415
GR5363/5	★ Harvard Graphics for Windows	369.
U-Lead		
GR5463	★ ImagePairs	169.

Walt Disney Computer Software		
GR1174	The Animation Studio	75
Zsoft		
GR0534	PC Paintbrush 5+	99.

CAD PRODUCTS

American Small Business Co.		
CA0233	Design CAD 3D 4.0	249.
CA0203	Design CAD 2D 5.0	175.
AutoDesk		
CA0173/5	Autosketch 3.0	146.
Generic Software		
CA0074	Generic CADD 6.0	285.

BUSINESS

Abrecedata		
BS6344	Everybody's Planner	49.
AddStar		
JT2194	SuperStor 2.0	69.
Alpha Software		
BS2164	★ Alpha FOUR Version 2.0	339
Application Techniques		
UT2444	CaptracEze	45.
Approach Software		
BS1194	★ Approach for Windows	149.
Artworx		
BS5004	Graphix 2.0	115.
AutoMap, Inc.		
BSF084	★ AUTOMAP for Windows	59.
Borland International		
BS0774	◆ dBASE IV 1.5	519
BS0214	◆ Paradox 3.5	519
BS3044	◆ Quattro Pro 4.0	319.
Campbell Services, Inc.		
BS1584	★ OnTime for Windows	75
Calera		
LT2304	★ FAXGrabber	105
Central Point Software		
UT2874	Centra, Point Anti Virus 1.3	85
UT2133/5	★ PC Tools 7.1	119
Computer Associates		
BS5423	★ dBase	349
FN0533	★ ACCPAC Simply Accounting for Windows	129.
Contact Software		
BS6354	★ ACT! for Windows	249.
Daniels Tech.		
UT2344	★ WinStealth Gold 3.0	105
Datastorm Tech.		
CM0424	PROCOMM PLUS 2.01	72
CM0634	PROCOMM PLUS for Windows	85.
Delrina Technology		
BS2604	★ Perform PRO 3.0	185
FX0154	★ WinFax Pro 2.0	75
GR2853/5	★ Perf 3RM Pro Designer & Filter 2.1	90
Fifth Generation		
UT0724	Direct Access 5.1	65.
UT2184	Fastback Plus 3.0	125.
Helix		
BS2154	NETROOM 2.0	59.
IBM		
UP0233/5	★ OS/2 2.0 Upgrade DOS	95.
Inset Systems		
UT1614	HiJack 2.1	119
Intelli		
FN0164	Quicken 5.0	43.
FN0564	★ Quicken for Windows	49
Lotus		
S0153/5	★ Lotus 1-2-3 & Ami Pro 2.0 Upgrade	155
BS7014	★ Ami Pro 3.0	249.

BS5203/5	◆ Lotus 1-2-3 3.1 Plus	419
BS5793/5	◆ Lotus 1 2 3 Rei 2.4	349
BS5253/5	◆ Lotus 1-2-3 for Windows	399
BS5713/5	◆ Lotus Freelance Graphics for Windows	339
BS5636/5	◆ Smart Pcs for Windows	99

Microcom		
CM0574	★ Carbon Copy for Windows	119
CM0084	Carbon Copy Plus 6.0	122
Microsoft		
UP0153/5	DOS 5.0 Upgrade	65
BS3253/5	★ Excel for Windows 4.0	309
BS0705	Fontcase + Dev. System 2.10	219
BS4063	★ One Pro 2.0	475
BS4103/5	★ Office 5 for Windows	485
BS2704	★ Project for Windows 3.0	445
BS5873	★ Software Development Kit for Windows	229
WP0043/5	Word 5.5	209
WP0374	★ Word for Windows 2.0	299
BS5324	★ Microsoft Works for Windows	129
BS0173/5	Works 2.0	95

MICROSPEED		
UT2924	Cursor Deluxe 1.0	\$29
Multisoft Corporation		
UT2554	PC Kwik Power Pak /Power Disk Bundle	82
UT1493/5	Super PC Kwik 4.1	45

Norton-Lambert		
CM0503/5	★ Close-Up Dual Pack Windows & DOS119	
Oana Corporation		
BS3124	★ The DeskTop Set 3.0	79

PACIFIC MICRO		
UT2903	Mac-In-DOS	59

PC Globe, Inc.		
BS1834	PC Globe 5.0	37
BS1844	PC USA 2.0	29.

Peachtree Software		
FN0654	Peachtree Basic Accounting 6.0	75

Polaris		
BS2894	★ PackRat 4.0	259

Power Up Software		
BS1654	Calendar Creator Plus 4.0	43

Qualitas		
UT0684	386MAX 6	61

Quarterdeck Office System		
BS1043/5	DESOnwe 386 2.4	129
EX1103/5	QEMM 386 6.0	61

Reference Software		
WP0514	★ Grammatik Windows	55

Software Solutions		
UT1195/5	Software Carousel 6.0	55

Salmaker Software		
BS1923/5	BetterWorking Eight-In-One	32
BS3604	★ PFS Window Works	95

Symantec		
UT2273/5	Norton AntiVirus 2.0	85
UT2183/5	★ Norton Desktop for Windows	99
UT2313/5	◆ Norton Util. Advanced 6.01	115
UT2793/5	★ Norton Backup 2.0 for DOS	99
CM0173/5	PC Anywhere 4.5 Host and Remote	119
BS3133/5	★ Q&A 4.0	255
BS3133/5	★ On Target 1.0	255

Technology Interchange Group		
BS5115	The Rescue Disk Survival Kit	169
BS5505	Your PC Inside-Out	169

Televare		
FN0413	★ M.V.D.B. for Windows	135

Timeslips		
BS5953/5	★ TimeSheet Professional for Windows	129
BS6814	Timeslips 5	195

Tool Technology Publishing		
UT2253	★ WinTools	125

**OVERNIGHT DELIVERY
ONLY \$7.00
1-800-367-7080**

**Micro
WAREHOUSE**

GUARANTEE



Timeslips 5

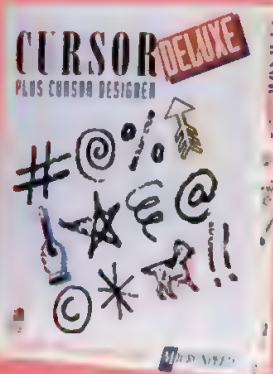
Timeslips 5 is re-engineered to help you better manage and control your business. Determine which clients and projects are profitable, and see where your hours are going. New features include multiple billing rates, work in progress reports, Client and User History reports including year-to-date and inception-to-date figures, and a redesigned security system. The Single User Edition records time and expenses for up to eight people. Also available: **Timeslips 5 Enterprise Pack 2 Station edition** BS6823/5 \$389. **Timeslips 5 Enterprise Expansion Kit** (adds 3 additional stations to the Enterprise Pack) BS6833/5 \$229. Publisher: **TIMESLIPS, Corp.** **Timeslips 5 Single User** BS6814

\$195

Cursor Deluxe

Finding that little Windows arrow in the midst of text, graphics and lots of open files can be incredibly frustrating. Make your Windows cursors easier to see with **Cursor Deluxe**. Now you can customize your own large, small, even animated cursors - firing rocket ships, huge arrows, even a dog wagging its tail! Plus select new wait signals (replace the standard Windows hour glass with a working stoplight!), I-beams (with Gothic accents) and window re-size tools (finally make 'em big enough to see) And with included **Cursor Designer**, you can create your own custom animated cursors. Easily edit and make your own custom-perfect cursors for presentations, LCD screens, or just for fun. Publisher: **MICROSPEED 1T2924**

\$29



Practical Modem 14400FXSA

The Practical Modem 14400FXSA V.42bis Stand Alone combines all the benefits of the latest high speed data, modem, and fax technologies into a single integrated package. This V.32bis external Hayes-compatible modem offers data transmission rates of up to 14400 bps, with automatic speed adjustment to avoid any data loss and ensure maximum throughput. Combining V.42 error control and V.42bis data compression, effective throughputs up to 57,600 bps can be achieved. The 14400FXSA provides universal connectivity, supports full duplex operation, MNP levels 2-5, Trellis Code Modulation and echo cancellation technology. Includes free Quick Link II fax communications software and the manufacturer's lifetime warranty. Manufacturer: **Practical Peripherals MM2100**

\$419



Persona PC Speakers

Persona PC Speakers provide high quality stereo from your PC. If you're working with MIDI synthesizers, CD-ROMs, interactive videodiscs, or voice synthesis, you'll appreciate these compact, full-range, 20 watt speakers. Frequency response is 5Hz to 19KHz, and they have internal amplifiers. A unique Sonic Imaging Control creates robust three-dimensional sound. The set includes two speakers which mount easily to the sides of any monitor with Dual Lock mounting discs. EX2060 \$179.

Persona Micro Speakers

This high-powered, multimedia-perfect PC speaker system will provide impressively rich and faithful stereo sound reproduction for your computer games, CD-ROM, music and video editing, and multimedia presentations. Compact, lightweight and 100% magnetically shielded, Persona Micro Speakers put out enough power for the sound to really come alive. Manufacturer: **Persona Technologies EX2310**

\$65



★ACT! for Windows

ACT! for Windows is the contact manager and day planner that PC Computing called "the best contact management tool available." That's because it handles all your day-to-day activities with its integrated database, calendar, report generator and word processor. And it takes full advantage of Windows for icon intuitive ease of use. Fully customizable contact screens keep all the details about your contacts at your fingertips. Plan your day without typing. View your calendar by the day, week, or month, then add or modify with just a few mouse clicks. Need to reschedule? Simply "drag and drop" the activity to its new time slot. Even recurring activities are easily scheduled, prioritized, and brought to your attention - even if you're in another Windows program! Publisher: **Contact Software BS6954**

\$24.9



★Presentation Task Force CGM clip art 4.0

Now you can own the clip art PC Magazine recently called "...The best CGM clip art package for overall quality and usability." Presentation Task Force 4.0 is the only clip art product to feature over 3,500 high quality, color illustrations in one value-packed, comprehensive volume! Use PTF clip art to enhance presentations, newsletters, and spreadsheets created with over 60 leading DOS and Windows applications, including CorelDraw!, Designer, Harvard Graphics, Microsoft Publisher, PageMaker, Persuasion, PowerPoint, Quattro Pro, Ventura Publisher, Word for Windows, WordPerfect, and many more! PTF 4.0 contains people, animals, business symbols, medical illustrations, holidays, sports, military, and environment related images. Publisher: **New Vision Technologies, Inc. GR3171**

\$134



Mac-In-DOS for Personal Computers

Break the Barrier between Macintosh and DOS! With Mac-In-DOS, DOS users are able to directly read, write, and format Macintosh 1.44 MB diskettes from the PC's internal 3.5" floppy drive.

No physical connection or additional software is required to run Mac-In-DOS. In addition, text files can be translated while being transferred. Spreadsheet, graphics, images, and other types of file formats are transferred as is. Available for both DOS and Windows. Publisher: **PACIFIC MICRO DOS Version 1T2903**

\$59

HARDWARE
VGA-to-NTSC Boards

connector fits in a 16-bit slot, this adapter operates at only 8 bits on the expansion bus. (Truevision plans to release a full-length 16-bit version but has not yet established a price.) Connections supported by the card include RCA composite-video input and output jacks, a VGA port, and a single six-pin S-video port with a splitter for four-pin S-video input and output (rather than using separate jacks on the back of the card). The Truevision VideoVGA will also support the Targa Plus line of frame-capture boards via a feature connector cable that comes standard.

The Truevision VideoVGA board is capable of a maximum recordable graphics resolution of 640-by-480 with 256 simultaneous colors and a 70-Hz vertical refresh rate.

HANDY SOFTWARE

An automated software utility makes installation a painless task. Truevision's package also includes Entropy Engineering's Video Titler character overlay software and a basic DOS TSR control utility that uses about 20K of memory. The TSR can be used to select key colors from a range of 256 color values, turn NTSC output on and off, and overlay VGA graphics. You can select video modes via Ctrl-Shift key combinations.

The company has also added a handy shareware package called VPIC, a graphics file viewer and converter that allows you to display and translate .GIF, .PCX, .PIC, .SCX, and .TGA graphics file formats. VPIC is particularly convenient for those users with extensive graphics file databases. The only software utilities the

package lacks are controls for positioning and effects.

TRUEVISION AT WORK

The VideoVGA turned in generally excellent scores in terms of NTSC signal output. Its noise measurements were among the lowest of the adapters we tested, and it posted the best result in gen-

Truevision includes VPIC, a graphics file viewer and converter that is particularly convenient for users with extensive graphics file databases.

► **FACT FILE**

Truevision VideoVGA

Truevision Inc., 7340 Shadeland Station,
Indianapolis, IN 46456; 800-344-8783,
317-841-0332; fax, 317-576-7700

List Price: With 8-bit ISA board, S-video splitter cable, DOS control utilities, Video Titler, VPIC, \$1,195.

Requires: Standard VGA or multiscanning monitor, NTSC video monitor.

In Short: The Truevision VideoVGA is a solid contender in the desktop video arena. Its strong performance and reasonable price, which includes on-board VGA, make it worth serious consideration.

 ON READER SERVICE CARD



The quickest way
between two points used to be
a straight line.

VGA-to-NTSC Boards

lock mode, with a score of -78.1 dB RMS. On our High-Frequency Response tests, the adapter was second only to the Magni VGA Producer Pro by a hair. There was no noticeable frequency loss at any of the levels we measured. Color fidelity with this board was also good, with no appreciable phase shift detected. Its 95-IRE Gain measurement was only marginally below the ideal, and in testing, we witnessed only a slight decrease in color saturation.

While a solid performer on PC Magazine Labs' benchmark tests, the VideoVGA lacks a number of features that would help it surpass Magni's more expensive adapter. During our hands-on evaluation of the VideoVGA, the absence of anti-flicker and anti-jitter circuitry was a distinct deficit when we made it overlay

Windows graphics. When changing graphics programs, we noticed a brief loss of the genlocking. The Magni board, by comparison, has a fast lock feature.

In general, the VideoVGA's image performance on our NTSC-compatible monitor was good. But like most of the other boards we evaluated for this review, the VideoVGA did exhibit some overscan on graphics overlays. A horizontal under-scan control helped, but about half an inch was still cut off from the vertical portion of graphics.

The VideoVGA benefits greatly from Truevision's experience in the graphics market. It has superior documentation and a wide array of high-resolution VGA drivers, including those for AutoCAD, Microsoft Windows, Ventura, WordPerfect, and Word-

Star. The Truevision VideoVGA is a strong offering in the burgeoning area of desktop video. Hopefully, products like this one will entice more people to begin working in this young medium.

Willow Peripherals

Willow VGA-TV GE/O

BY ROBERT KENDALL

Willow Peripherals was one of the first vendors to market a genlocking VGA-to-



NTSC board. This pioneer's \$695 Willow VGA-TV GE/O has some attractive features, but the board has been on the market for two years and is now starting to show its age.

The VGA-TV GE/O leads a double

Now it's Parallel Tasking.™

Introducing EtherLink® III, with Parallel Tasking, the fastest, most advanced adapter family available.

EtherLink III is 25 percent faster than the leading adapter today. Its Parallel Tasking design uses pipelining to push communication between PC and network to the limit. It's so unique it's even patent-pending.

The result: a 16-bit adapter family that lets you take full advantage of your ISA and EISA machines.

Yet EtherLink III is so easy to install, all you type is one command. The adapter does the rest, configuring

itself automatically. And it comes with network management capabilities and supports all major media types. Yet for all this, the EtherLink III family is so reliable that should one ever fail, 3Com will replace it free of charge.

To learn more about this remarkable adapter and its surprisingly low price, call 1-800-NET-3Com. Or see your nearest 3Com reseller. You'll find an adapter technology that's faster than all the others.



© 1992 3Com Corp. (408) 764-5000. 3Com, EtherLink, and Parallel Tasking are trademarks of 3Com Corp.

CIRCLE 293 ON READER SERVICE CARD

Mary Sue Will You M

PowerPoint 3.0. Because deserves a great pres

It's been said that the most valuable currency in the '90s will be



With our unique Shape Tool, you needn't be an artist to easily create terrific diagrams that result in eye-catching, professional overheads, 35mm slides or on-screen presentations.

ideas. But having an idea and communicating an idea are two entirely different things. Which brings us to our point. Or rather, PowerPoint®. How do you turn your ideas, the points that you want to make, into powerful, convincing presentations?

Consider Microsoft® PowerPoint presentation graphics program for



a great idea entation.

Windows™ or the Macintosh®. It will help you get your ideas down, and help you organize exactly what it is you want to say. Secondly, it will assist you in making certain all of your presentation materials not only look great, but make a very strong business impression as well.

Let's begin with the ideas. First

you want to get them down. With PowerPoint, you can work out your entire presentation in Outline View. Or you can develop your thoughts right on your slides. The next step is to graphically express those ideas. With PowerPoint, your choices are astounding. Over 150 templates you can easily apply at any time to give your presentation a professional look. A Shape Tool that lets you easily create diagrams from a palette of commonly used shapes. Plus 84 styles of graphs, including 3-D graphs that rotate. And with the Slide Master feature, you can easily make last-minute changes to your master slide (like adding a logo, for example), and all your other slides will automatically change. So only one change is necessary.



PowerPoint is a part of the Microsoft family of integrated software products for the Windows 3.1 and the Macintosh operating systems.

Now everything is in place. Everything makes sense. Everything looks terrific. So go ahead. Feel confident about your presentation. After all, now it's as great as your ideas.

If you'd like to hear more about the PowerPoint program, including our 90-day money-back guarantee, call (800) 541-1261, Dept. Y25. Or visit your nearest Microsoft reseller.

Microsoft
Making it easier

VGA-to-NTSC Boards

life as a Super VGA board, and installation is simply a matter of popping the board into a 16-bit slot. No cables come with the adapter, however, so you will find yourself either procuring your own or ordering them separately from the company.

The Willow board holds both a composite-video and an S-video jack for NTSC output, but for video input there is only a composite-video jack. In addition, the Willow board's S-video output jack cannot be used when genlocking. When you are genlocking, the overlaid VGA and NTSC signals are sent out to the monitor through the composite-video port.

The VGA-TV GE/O uses the Tseng ET3000 video chip, an older model than that used by other boards with on-board VGA in this roundup, and unfortunately the age factor showed. The VGA-TV GE/O produced a Graphics Winmark score of 0.83 million, which is less than half the throughput produced by the Everex Vision VGA with Overlay. Even so, the 16-bit VGA-TV GE/O was able

to outperform the 8-bit Cardinal SNAP-plus on this particular test.

NTSC OUTPUT

The VGA-TV GE/O can display VGA graphics on an NTSC monitor in resolutions up to 640-by-480 with 256 colors. The board lacks an anti-flicker filter, though, which often makes detail difficult to discern, and fringing was sometimes a pronounced problem. These could be serious handicaps when you need to convert complex VGA animations or presentations to videotape.

The product fared better when overlaying titles and simple animations onto NTSC video, producing very presentable output. A TSR lets you interactively select the key color from 256 possibilities or center the VGA image;

the TSR takes up only 10K. If you're willing to sacrifice 512K, you can use command-line entries. In genlock mode, you can toggle the VGA and NTSC signals on and off independently to display either or both on the NTSC monitor. The

program is marred by problems such as inaccurate documentation, however.

One annoyance in genlocking mode is that when a tape deck is hooked up to the video-in jack, the overlaid VGA graphics appear in color only when the tape is running. The overlaid graphics are reduced to monochrome when the tape is stopped.

The only way around this is to disconnect or turn off the tape deck each time you stop it.

On PC Magazine Labs' benchmark tests, the VGA-TV GE/O's performance

The \$695 Willow VGA-TV GE/O was a solid performer on our tests. The board's High-Frequency Response results were very good, as were its Phase Shift scores.

How One Man Keep 783 Peo

Introducing A Revolutionary New Way

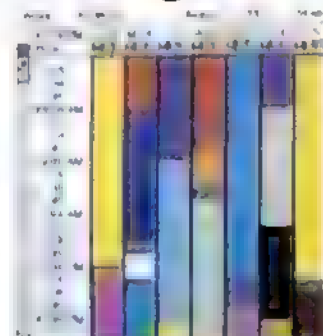
Whether you're a single user or on a network, new CA-UpToDate is the best way to organize, schedule, coordinate and manage

CA-UpToDate



people, resources, individual calendars and workgroup schedules.

One click of a mouse is all it takes to find an available



conference room, search for a free time block, send a memo to a hundred people, schedule a meeting for 25 differ-



VGA-to-NTSC Boards

ranged from average to slightly better than average. While the board's result on our Noise-F test was -43.7 dB RMS (the second-poorest score), its performance was a much improved -57.8 dB RMS on our Noise-G test. Additionally, the board's High-Frequency Response re-

sults were very good. In addition, its scores on the Subcarrier Horizontal Phase and Phase Shift tests were eminently acceptable.

Bundled with the board is Entropy Engineering's popular Video Titler, which works much like a screenshow program for adding titles with delays and transition effects.

Unfortunately, the program is incompatible with Willow's TSR, so you have no control over key color (it is always Color 0 of the .PCX file's palette). For \$495, Entropy Engineering will provide you with Video Titler HRT, a version designed for the VGA-TV GE/O that lets you put text and graphics on tape at 1,280-by-480.

As with most of these products, you can't adjust the NTSC signal's character-

istics, such as hue or saturation, or fade the signal in or out. The VGA-TV GE/O is one of only three devices that doesn't offer underscan or overscan controls.

With a street price that should be below \$600 by the time you read this, the Willow VGA-TV GE/O is among the cheaper products in this roundup, and is quite capable at titling and overlaying. But the board's limitations, such as the less-clear NTSC image it generates from complex graphics, curtail its usefulness. □

Most of these boards don't let you adjust the NTSC signal's characteristics, but the Willow board is one of only three devices that doesn't offer underscan or overscan controls.

LORI GRUNIN IS AN ASSOCIATE EDITOR OF PC MAGAZINE. TOM GIEBEL IS THE LIBRARIAN AT PC MAGAZINE. ROBERT KENDALL AND JOHN R. QUAIN ARE FREQUENT CONTRIBUTORS TO PC MAGAZINE.

FACT FILE

Willow VGA-TV GE/O

Willow Peripherals, 190 Willow Ave.,
Bronx, NY 10454; 800-444-1585,
718-402-9500; fax, 718-402-9603

List Price: With 16-bit ISA board, DOS control utilities, Video Titler, \$695; PAL version, \$795.

Requires: Standard VGA or multiscanning monitor, NTSC video monitor.

In Short: The VGA-TV GE/O includes on-board Super VGA and did well on most of our performance tests. But it has some limitations that make it less than an optimum choice. For instance, scanned VGA images suffer greatly from flicker, and fringing is sometimes a pronounced problem.



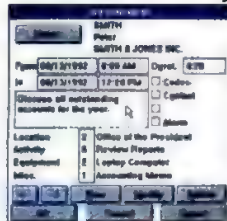
ON READER SERVICE CARD

And A Mouse ple UpToDate.

To Manage Time, People, And Resources.

ent users with full agendas, make lunch plans with a client or remind your entire 783-person sales team of top priorities and deadlines.

And it's so easy. The colorful, graphical look and feel



of CA-UpToDate makes it quick and simple to learn. The color-grid schedules, pop-up menus, warning beeps and reminders help you keep



track of hundreds of people, events and resources with very little effort.

Call 1-800-CALL CAI today for your free demo disk.

It will show you how easy it is to bring you and your entire company UpToDate.



COMPUTER ASSOCIATES
Software superior by design.

© Computer Associates International, Inc., One Computer Associates Plaza, Islandia, NY 11788-7000 All product names referenced herein are trademarks of their respective companies.

CIRCLE 361 ON READER SERVICE CARD



PC WEEK SHOOT-OUT? MORE LIKE THE ORACLE CARD BLOWOUT.

"At PC Week's *Live Multipatform Database Delivery Shoot-Out*, the 14 judges gave Oracle's client-server solution a resounding victory overall. Combining the graphical convenience of its Oracle Card™ front-end tool with the reliable data handling of the ORACLE database server, Oracle Corp. scored first in 19 of 35 detailed evaluation criteria."

"In fact, Oracle was the only entry to score a 3 or better on every one of the 35 detailed evaluation criteria."

—PC Week

Technically, it was a 4-way shoot-out. But technologically, there were just 2 contenders.

The new. And the old.

In Oracle's second shoot-out victory in barely 3 months, Oracle Card shot down the competition, demonstrating that old or remodelled PC technology just won't solve today's client-server problems.

Version 1.1 is now shipping at \$699 for the

developers' version with new runtime pricing available. Sheer graphical power has never been this cost effective.

See for yourself; call 1-800-633-0518 Ext. 4455 to qualify for a free demo disk. And let Oracle put you in the pilot's seat.

ORACLE®

Software that runs on all your computers.

SQL: THE SEQUEL

Front-end Tools

The myriad SQL access tools available can easily have you shaking your head in bewilderment. Whether you need a dedicated tool for query or analysis, or an add-on to integrate SQL data with other applications, you'll find hundreds of choices.

by Jonathan Zuck

In our last issue we looked at SQL databases, those powerful engines on the server that store, protect, and control access to a company's most valuable data. In this issue we look at front-end tools—the client-side software that is used to access and analyze the data stored on the server.

There are literally hundreds of front-end tools to pick from. We will give you an overview of the technology along with reviews of some of the more interesting and innovative products.

THE RANGE OF FRONT-END TOOLS

For the purpose of discussion, we have divided the range of SQL front-end products into three general categories: query and report tools, analysis tools, and development tools. In reality, the market is moving very quickly to blur these distinctions, but such groupings provide us with useful categories for evaluation.

There is one huge category that isn't represented in this breakdown: standalone applications with SQL hooks. There is a trend in the industry toward providing virtually any application that uses data with access to information stored in SQL databases. This includes applications as disparate as design



IN THIS REVIEW

<i>ClearAccess for Windows</i>	297
<i>Personal Access</i>	301
<i>Quest</i>	302
<i>Forest & Trees for Windows</i>	307
<i>LightShip and LightShip Lens</i>	308
<i>InfoAlliance for Windows</i>	314
<i>JAM/DBi for DOS</i>	318
<i>ObjectView</i>	322
<i>PowerBuilder</i>	326
Summary of Features	300

tools (such as Autodesk's AutoCAD), spreadsheet programs (such as Microsoft Excel or Lotus 1-2-3), and stand-alone database systems (such as Borland's dBASE or Fox Software's FoxPro). In this story we review tools that are dedicated to accessing SQL data.

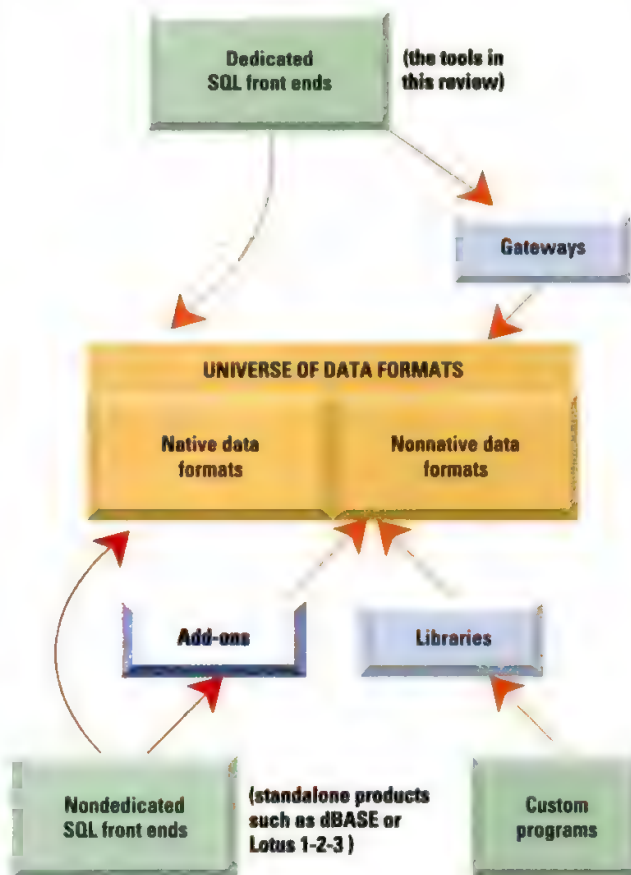
The single most important consideration when choosing a front-end tool is which back-end engines it supports. There has been a race among vendors to have their tools support as many SQL databases as possible. At the same time, there has been a movement within the industry to adopt a standard so as to make the form of the data irrelevant (see the sidebar "Transparent Data Access: Cross-Platform, Cross-Format"). This approach, however, risks falling prey to the lowest-common-denominator pitfall. Back-end vendors are constantly striving to distinguish their products by adding features that go beyond existing standards. The real test of the emerging API (application programming interface) standards will be their ability to take advantage of the unique features of specific back-end engines.

Even today, with no standards in place, an important consideration when selecting a SQL front end is its "awareness" of the back-end engine—the depth of its support for a SQL engine's unique features. For example, Sybase Corp.'s SQL database engine includes a COMPUTE BY syntax. Many front-end tools cannot generate this statement or provide syntax checking for it. Also, some engines have unique data types, such as the BLOB data type for image data. When the front-end tool presents you with a list of data types, are special data types such as this on the list?

QUERY AND REPORT TOOLS

Query and report tools provide a quick and easy way to generate queries and formatted reports. A key criterion when evaluating query and report-writing tools

SQL Database Access Tools



is their accessibility to the end user. How difficult is it for the average user (without any knowledge of SQL) to construct a query or report? Is the interface intuitive? Are the output options flexible? If certain SQL statements cannot be generated by the menu system (such as nested queries), does the user have the option of going in and actually writing SQL statements? Can the generated SQL code be tweaked to improve performance?



Some tools, such as ClearAccess for Windows, specialize in on-screen reporting and have little or no printed reporting capabilities. Others, such as Quest, have their main strength in their reporting capabilities, while their on-screen options aren't as rich.

ANALYSIS TOOLS

The products in this category go beyond the bare minimum of retrieving raw data for viewing on-screen or on a printout. They massage raw data into useful information. The typical manifestation of such tools is an Executive Information System (EIS). Data is retrieved and then represented in an easy-to-understand format such as a graph or summary table. Very often there is some way to "drill down" from a more general display to a more specific one.

For example, if a pie chart is displayed with the elements Products, Services, and Investments, the user might be able to click on Products to see a graphical representation of the distribution of sales by product. This hierarchical analysis of data is the hallmark of most EIS systems.

Another strength of some analysis tools (including Forest & Trees for Windows from Channel Computing) is their ability to update the currently

displayed data periodically via timed or event-driven queries. Forest & Trees can also set "alarms" that are triggered when certain conditions are met in the data. For example, if you need to know when a stock price drops below a certain cutoff, you could set an alarm that would color-code the data in red.



Most analysis tools have the ability to access and integrate information from a variety of sources—various SQL engines and different file formats—for analysis and presentation as a single unit. ClearAccess and Forest & Trees both provide this capability. Pilot Software's Lightship can only access one data source at a time and cannot integrate the result sets, although the result sets can be displayed simultaneously.

Our Contributors: JOE SALEMI is a contributing editor to *PC Magazine* and author of the forthcoming *PC Magazine Guide to Client/Server Databases* from Ziff-Davis Press. JONATHAN ZUCK is president of User Friendly Inc., a Washington, D.C.-based consulting firm specializing in Windows and database technology.

SQL Front Ends

DEVELOPMENT TOOLS

There are three main types of SQL front-end development tools: SQL connectivity libraries for use with traditional programming languages such as BASIC, C, or COBOL; standalone versions of SQL database engines; and the new crop of dedicated SQL front-end builders. (See the sidebars "Standalone SQL Engines" and "Other Roads to SQL Access" for discussions of these products.) In this roundup we review a sampling of the many front-end development systems available today.

Most dedicated SQL front-end development tools employ an event-driven procedural language. Forms are designed graphically using visual objects and non-object-oriented code attached to these objects to handle various events. All the tools support simple events like entering a field or clicking a button, but the tools differ in the quantity of events they support and the degree to which they can be expanded.

Matesys Corp.'s ObjectView supports a strong function set but provides no way to extend the environment to support new events, while Powersoft's PowerBuilder (which also supports an impressive array of functions) allows you to add new events by trapping Windows messages; PowerBuilder also allows for the creation of aggregate "user-defined" events.

ObjectView is the easiest to learn of those we reviewed, but it provides the fewest high-end tools and the least flexibility. JAM/DBi provides the greatest level of flexibility and portability across platforms—but at the cost of a steep learning curve. PowerBuilder has succeeded in taking the middle road by providing users with both flexibility and ease of use.

Since the query and report tools, analysis tools, and development tools we look at are so divergent, it did not make sense to perform benchmark tests. And since this is a technology story rather than a comprehensive roundup, we did not award an Editors' Choice.

Our goal is to give you an overview of the types of tools available to developers, along with in-depth reviews of the more interesting and innovative products

in each area. The reviews that follow should make the world of SQL databases a little less confusing and the task of choosing a SQL front-end tool a little less daunting. We have by no means covered all the choices available to you. Our table, "A Selection of Dedicated SQL Front Ends," provides general information on dozens more.

ClearAccess Corp.

ClearAccess for Windows

BY JOE SALEMI

Version 1.0 of ClearAccess for Windows, from ClearAccess Corp., is a query and report tool that can serve as a data link between a SQL back end and any Windows application that supports DDE, such as Microsoft Excel. The package allows users to design complex nested queries easily through a menuing system; queries can be stored as scripts with prompting. Its ad hoc query capabilities are easy to use—end users won't even know they're working with SQL processes—and can be stored for reuse through script recording. There is also a Macintosh version of ClearAccess, and the same ClearAccess scripts will run on either platform.

Version 1.1, which should be released by the time you read this, adds support for Information Builders' EDA/SQL, which gives connectivity to a large number of databases. These include SQL databases from Ingres, Microsoft, Novell, Oracle, and Sybase, along with some non-SQL databases. For temporary storage of large amounts of output from a query, there is a local database repository called ClearBase.

UNIQUE QUERY ABILITIES

ClearAccess's main screen contains a five-icon toolbar that gives users the choice of running a script, editing a script, connecting to a database, querying the database, or quitting the program. Pull-down menus offer similar choices, as well as commands for starting and stopping the script recorder and for creating a predefined join of data from different tables.

The query window is the heart of



ClearAccess for Windows' main menu is a small icon bar. Clicking on the Connect icon brings up a screen that lets the user access local or remote databases.

ClearAccess. Once a connection is established to a local or remote database, the query window presents lists of all the accessible tables in the database; when a table is chosen, the columns in the table are displayed in a second window. Queries are built by clicking on the necessary columns and dragging them to a window on the right side of the query screen. The conditions and sorting options for the query are then chosen and entered. ClearAccess has the unique ability to generate nested queries from a menu, without the user having to write any SQL code. Other query options let the user format the results, create joins, and edit the various conditions prior to running the query.

The results can be returned to the screen or to the Windows Clipboard; they can also be saved to a file in comma- or

FACT FILE

ClearAccess for Windows, Version 1.0

ClearAccess Corp., 200 W. Lowe Ave.,
Fairfield, IA 52556; 800-522-4252,
515-472-7077; fax, 515-472-7198

List Price: \$460.

Requires: 400K RAM, 1MB hard disk space, Microsoft Windows 3.x.

In Short: ClearAccess, an easy-to-use Windows program, can create ad hoc queries of surprising complexity. Its scripting and

DDE capabilities make it an excellent tool for creating links between a database server and other Windows applications.

ON READER SERVICE CARD



CONVENTIONAL WISDOM HAS IT THAT COMPAQ HAS THE BEST FEATURES, AND ZEOS AND GATEWAY THE LOWEST PRICES.

IT ALSO SAID DISCO AND COMMUNISM WERE HERE TO STAY.

Pardon us while we mess with your reality.
But the new Dimension™ line from Dell is about to
make conventional wisdom look pretty dumb.

Introducing Dimension, a line of high-quality,
full-featured PCs. From notebooks to i486 floor-
standing systems.

Dimension systems can be up to \$500 less than
equivalent PCs from Compaq, Gateway or Zeos.**
Each Dimension desktop comes with at least three
drive bays and four ISA slots, versus two in some
competing systems. And with Dimension PCs you
don't pay for a load of software you may not need.

We don't skimp on service either. We offer
on-site second-business-day service, toll-free help,
24-hour TechFax,™ and a 30-day money-back
guarantee.† All from a FORTUNE 500® company.

So if you want a great computer at an incredible
price, just give us a call. You'll find Dimension is
anything but conventional.

DIMENSION™ 486SX/25

\$1,799

Lease: \$67/MO.

i486™ SX 25 MHz System
4 MB RAM, 120 MB Hard Drive, Dual Floppy Drives (3.5"
and 5.25"), Ultra VGA 1024M Monitor (14", 1024 x 768,
.28mm), MS-DOS® 5.0/Microsoft® Windows™ 3.1/Mouse

DIMENSION 486DX/33

\$2,299

Lease: \$85/MO.

i486DX 33 MHz System
4 MB RAM, 212 MB Hard Drive, Dual Floppy Drives (3.5"
and 5.25"), Ultra VGA 1024M Monitor (14", 1024 x 768,
.28mm), MS-DOS 5.0/Microsoft Windows 3.1/Mouse



**Actual dealer prices may vary. †Service provided by BancTec Service Corporation. On-site service may not be available in certain remote locations. ‡Rapid Response return-to-factory service only for NL notebook systems. †Leasing arranged by Leasing Group, Inc. i386, i486 and the Intel Inside Logo are trademarks of Intel Corporation. MS-DOS and Microsoft are registered trademarks and Windows is a trademark of Microsoft Corporation. FORTUNE 500 is a registered trademark of The Time Inc. Magazine Company. Dell disclaims proprietary interest in the marks and names of others. ©1992 Dell Computer Corporation. All rights reserved.



\$2,199

Lease: \$81/MO.

DIMENSION 486SX/25s i486SX 25 MHz System
4 MB RAM, 212 MB Hard Drive, Dual Floppy Drives (3.5" and 5.25"), Ultra VGA 1024NI Monitor (14", 1024 x 768, .28mm), MS-DOS 5.0/Microsoft Windows 3.1/Mouse

\$2,699

Lease: \$100/MO.

DIMENSION 486DX/33s i486DX 33 MHz System
8 MB RAM, 212 MB Hard Drive, Dual Floppy Drives (3.5" and 5.25"), Ultra VGA 1024NI Monitor (14", 1024 x 768, .28mm), MS-DOS 5.0/Microsoft Windows 3.1/Mouse

Don't find
yourself stranded.
Buy from us and
get second-business-
day on-site service.



\$1,499

Lease: \$55/MO.

DIMENSION NL20 i386™SL 20 MHz System*

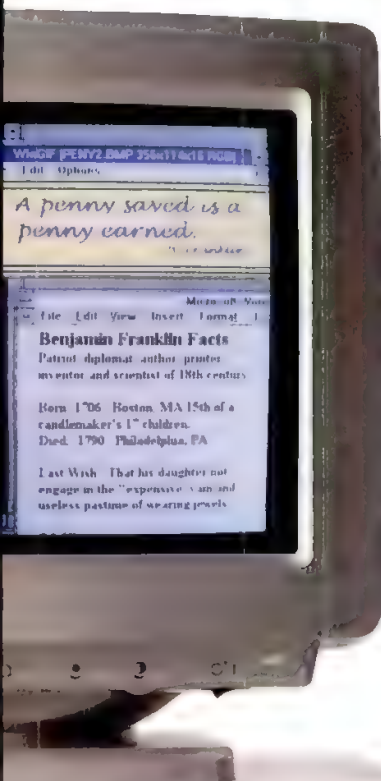
2 MB RAM, 40 MB Hard Drive, Weight: 6.3 lbs. including battery, Minimum battery life: 2.5 hours, Edgelit VGA LCD (8.5" Diagonal, 640 x 480), MS-DOS 5.0/Microsoft Windows 3.1/Mouse

\$1,799

Lease: \$67/MO.

DIMENSION NL25

i386SL 25 MHz System
2 MB RAM, 60 MB Hard Drive, Weight: 6.3 lbs. including battery, Minimum battery life: 2.5 hours, Edgelit VGA LCD (9.5" Diagonal, 640 x 480), MS-DOS 5.0/Microsoft Windows 3.1/Mouse
*Rapid response service only



Did we mention that
you don't have to go to
your typical retail
computer store to get
one of these computers?

A penny saved is a
penny earned? Big
deal. \$500 saved
is an Ultra VGA
Monitor earned.



Did we
mention we're a
FORTUNE 500
company?

\$1,359

Lease: \$50/MO.

DIMENSION 386SX/25 i386SX 25 MHz System

4 MB RAM, 80 MB Hard Drive, Dual Floppy Drives (3.5" and 5.25"), Super VGA 1024I Monitor (14", 1024 x 768, .28mm), MS-DOS 5.0/Microsoft Windows 3.1/Mouse

\$1,549

Lease: \$57/MO.

DIMENSION 386DX/33 i386DX 33 MHz System

4 MB RAM, 80 MB Hard Drive, Dual Floppy Drives (3.5" and 5.25"), Super VGA 1024I Monitor (14", 1024 x 768, .28mm), MS-DOS 5.0/Microsoft Windows 3.1/Mouse

Dimension
by **DELL**

1-800-531-2754

HOURS: 7AM-9PM CT MON-FRI, 8AM-4PM CT SAT, 10AM-3PM CT SUN.

WHEN CALLING, PLEASE REFERENCE #11BY5.

CIRCLE 164 ON READER SERVICE CARD

► SUMMARY OF FEATURES

SQL Front Ends

In alphabetical order by category

■ = YES □ = NO

	QUERY AND REPORT TOOLS			ANALYSIS TOOLS			
	ClearAccess for Windows	Personal Access with Spinnaker PLUS for Windows	Quest	Forest & Trees for Windows	InfoAlliance for Windows	LightShip and LightShip Lens	
List price	\$460	\$695	\$595	\$495	\$495	\$1,190	
Formats Supported							
SQL engines from:							
Gupta	□	□	■	■	□	■	
IBM	■	□	■	□	■	■	
Ingres	■	□	□	□	□	■	
Microsoft	■	■	■	■	■	■	
Novell	■	□	□	■	□	■	
Oracle	■	■	■	■	□	■	
Sybase	■	■	■	■	□	■	
XDB	□	□	□	□	□	■	
Client platforms:							
DOS	□	□	□	■	□	□	
OS/2	■	□	□	□	■	□	
Windows	■	■	■	■	■	■	
Can act as DDE client	□	■	■	■	□	■	
Can act as DDE server	■	■	■	■	■	□	
Data Sources							
Accesses multiple sources in one query	■	■	□	□	■	□	
Integrates and displays data from multiple sources	□	■	■	■	■	■	
Joins tables from multiple sources	■	■	□	□	■	□	
Schedules queries for automatic updates	□	■	□	■	□	■	
Updates server database	■	■	■	□	■	■	
Updates multiple databases at once	■	■	□	□	□	■	
Programming							
Constructs queries from menus	■	□	■	■	■	■	
Constructs nested queries from menus	■	□	□	■	□	■	
User can view constructed SQL code	■	□	■	■	□	□	
User can edit generated code	■	■	■	■	□	□	
SQL syntax help on-line	■	□	■	■	□	□	
Native programming or scripting language	■	■	□	□	□	■	
Debugging features:							
On-the-fly syntax checking	□	■	N/A	N/A	N/A	□	
Allows testing of application under development with existing package	■	□	N/A	N/A	N/A	■	
Traces through program	□	□	N/A	N/A	N/A	□	
Application Distribution							
Distribution requirements	N/A	DLL	N/A	N/A	DLL, run-time module	DLL, run-time module	
Free distribution	N/A	□	N/A	N/A	■	□	
Technical Support							
Free technical support	Unlimited	45 days	90 days	None	None	90 days	
Toll-free number available	■	□	□	■	□	□	

N/A—Not applicable The product does not have this feature

SQL Front Ends

path-delimited ASCII, SYLK, or .WKS formats for importing into other applications. Results from different databases can be joined by storing the different result sets in a local ClearBase database and creating a join on the local tables. Or the result sets can be sent directly to the Clipboard for manual or automatic pasting into another Windows application.

SCRIPTING POWER

ClearAccess's power lies in its scripting capabilities. The scripting language has over 50 commands that provide broad functionality. For example, it lets the developer prompt the user for values during script execution so that ad hoc queries can be created and run through scripts.

Scripts can be created by recording an ad hoc query or via a text editor. Existing scripts can be edited through the built-in editor and are run from the main menu. Simple debugging is supported that lets the developer pause scripts during execution or watch the actual dialog between the script and the database server in a separate window. Scripts can be stored on either the server or the client.

The ClearLinks module, bundled in the package, acts as a direct automatic query link for Microsoft Excel and other Windows applications that support DDE. ClearLinks adds another 27 scripting commands that control the DDE functions and lets ClearAccess act as either a DDE client or DDE server. Other Windows applications can be started and stopped by a ClearAccess script, which lets the developer completely automate the process of querying the database and moving the results directly to another application for reporting or analysis. Excel is supported directly through an included add-in document that lets Excel macro sheets directly access and run ClearAccess scripts to query databases. A floppy disk bundled with Version 1.0 (the feature is incorporated into Version 1.1) adds links to Informix Software's Wingz and Microsoft Visual Basic.

ClearAccess is an excellent tool for creating and running ad hoc queries from a wide array of data sources. The best way to use it, however, is as a linking application: Its strength lies in its ability to automate database access and automatically pass the results to other Windows applications for further reporting or analysis.

DEVELOPMENT TOOLS

JAM/DBi for DOS	ObjectView	PowerBuilder
\$990	\$899	\$3,495

☒	☒	☒
☒	☐	☐
☒	☒	☐
☒	☐	☒
☒	☒	☐
☒	☒	☒
☒	☒	☒
☒	☒	☒
☒	☐	☐
☒	☒	☐
☐	☒	☒
N/A	☒	☒
N/A	☒	☒

☒	☒	☒
☒	☒	☒
☒	☒	☐
☒	☒	☒
☒	☒	☒
☒	☒	☒

☐	☒	☒
☐	☐	☒
☒	☒	☒
☒	☒	☒
☐	☐	☐
☒	☒	☒
☒	☒	☒
☒	☒	☒
☐	☐	☒

None	DLL, run-time module	DLL
☐	☒	☐

None	None	30 days
☒	☒	☒

Spinnaker Software Corp.

Personal Access

BY JOE SALEMI

Spinnaker Software's Personal Access, Version 1.5, works on top of PLUS for Windows, Spinnaker's Hypercard-like application development package. The Personal Access add-on provides easy access to data in a variety of formats by masking some of the more complicated facets of development with Spinnaker PLUS.

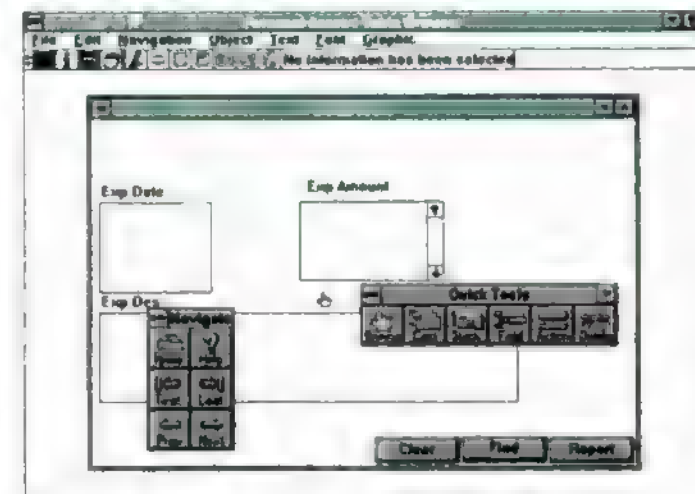


PLUS originated in the Macintosh world, and one of its strengths is that PLUS scripts will work with both the PC and Macintosh versions of the product. Personal Access, however, does not run on the Macintosh. Personal Access with PLUS is also resource-intensive for a query tool, requiring a 386-based PC or better with a minimum of 4MB of RAM.

Personal Access is an example of a product that spans two categories: query and report tools and development tools. We placed it in the query tool category because Spinnaker positions it as a quick and easy tool for accessing data.

EXTENDING SPINNAKER PLUS

PLUS is an object-oriented system that lets the user create stacks of cards that contain objects such as text fields, data fields, graphics, and control buttons. Cards are created by placing user interface objects in the foreground (present on only the visible card) or background (present on all cards in the same stack). A series of floating toolboxes makes designing and placing objects easy.



Personal Access uses the Spinnaker PLUS hypermedia-like development system for designing database queries.

SQL Front Ends

Personal Access extends the capabilities of PLUS to allow cards to access external databases, including SQL Server, Oracle Server, and non-SQL file formats such as Xbase, Paradox, and Btrieve. A Personal Access application consists of one or more cards that contain the actual data queries.

It's very easy to create queries in Personal Access. A series of dialog boxes and pick lists guides the user through the

The on-screen navigation menus with commands such as NEXT, PREVIOUS, TOP, and BOTTOM let the user move quickly around the stack of cards. Floating toolboxes give easy access to design tools. For example, the floating toolbox called Quick Tools lets the user create and browse card stacks, add fields to existing cards, or place predefined action buttons on a card. The presence of the floating toolboxes can be toggled on and off so they're not in the way when browsing data.

A SCRIPTING LANGUAGE

PPL, the PLUS Programming Language, is an event-driven scripting language of over 200 commands and functions that control message handling, properties, navigation, visual and sound effects, menus, and other user-interface tools. PPL scripts are generated automatically when cards are designed, and a built-in editor is included for tweaking scripts or for custom-programming card stacks.

The whole idea behind Personal Access is to put an easy-to-use front end on top of PLUS and its scripting language, so there are three basic reasons a developer might need to use PPL: to develop complete applications that can work outside of Personal Access, to replace Personal Access's menus with custom-designed menus, or to use DDE. PPL can also access external DLLs (dynamic link libraries) that can help broaden its capabilities. Spinnaker's Software Slot Developer's Kit (\$495) contains DLLs and header files that let programmers create PLUS extensions using C.

Personal Access provides a scripting window where you can enter and edit your script. When compiling, errors in the script will be highlighted and a message will let you know the nature of the problem. There are no debugging features, however, which is a serious limitation.

UTILITIES AND REPORTING

External utilities that assist in database management are provided with the package and can be run directly from Windows or through Personal Access. The Table Maintenance utility lets the user create and change database files, and a utility called Joiner lets the user describe links between different database tables for later use in PLUS card stacks. Index

Finder creates the associations needed to access indexed Xbase files through Personal Access.

The included PLUS Reports module is a full-screen WYSIWYG report designer that lets the user create row-and-column or free-form reports from data contained in card stacks. Bitmap graphics from the Windows Clipboard can be included in reports. Reports can be written to the disk, to the screen, or to a printer.

While Personal Access and PLUS are a powerful combination for accessing databases, they are not the easiest solution, since some development work is needed. Nor does PLUS take full advantage of Windows' capabilities. For example, you cannot run multiple stacks simultaneously in separate windows. But if you like the Hypercard format, Personal Access with PLUS may be a good choice for you.

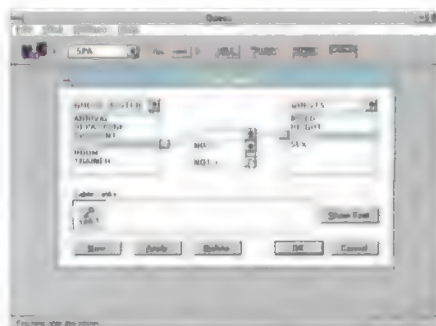
Gupta Technologies Inc.

Quest

BY JOE SALEMI

Gupta Technologies' Quest, Version 1.2.0, a Windows-based query and report tool, uses dialog boxes to insulate the user from the underlying SQL code. It has built-in functions to help analyze data, and can be used to pass query results to other programs for further analysis. Its greatest strength is its reporting tools; its biggest limitation is the lack of a charting function.

The single-user base package includes a standalone version of Gupta's SQLBase Server along with networked Gupta database connectivity. This lets the user use a local database for develop-



Quest uses a series of dialog boxes, pick lists and pull-down menus to build SQL queries from either a single table or linked tables.

FACT FILE

Personal Access, Version 1.5
 Spinnaker Software Corp., 201 Broadway,
 Cambridge, MA 02139; 800-323-8088,
 617-494-1200; fax, 617-494-1219

List Price: \$199, bundled with Spinnaker PLUS for Windows, \$695

Requires: 386-based PC or better, 4MB RAM, 5MB hard disk space, DOS 3.1 or later, Microsoft Windows 3.x, Spinnaker PLUS for Windows, VGA display recommended

In Short: Personal Access, which runs in conjunction with Spinnaker PLUS for Windows, uses a hypermedia-like card interface to query external database files. Little or no programming is needed, though power users have the option of creating complex applications using PLUS's scripting language

ON READER SERVICE CARD

process of selecting the database, tables, and columns to include in the result card. Dialog boxes are also used to guide the user through setting the query's search conditions. A single card can contain queries from multiple databases; up to 500 tables can be accessed through a single card. The user isn't limited to working with only one type of database at a time; if a common field exists, data from different database formats can be integrated and presented together.

Cards can be designed to show single records or to display multiple records in a table format. Cards can also be organized to provide increasingly detailed views of the data. For example, one card could contain a query of all the departments in a company; highlight a particular department, and the next card in the stack could contain the results of a query of all employees in that department.



Adding to
your network?
Get quality
IBM LAN
products and
software fast,
for less, and
direct from
IBM.

For
IBM
DIRECT,
call
1 800 426-2968

For a broad range of networking needs, call IBM DIRECT: 1 800 426-2968.

Get quality IBM products at special prices shipped within 48 hours—all with one toll-free number: 1 800 426-2968.

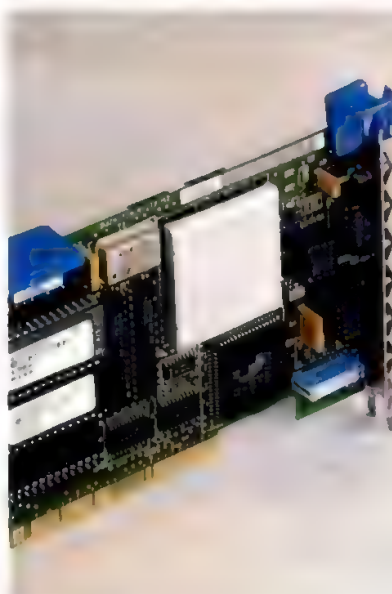
Shop for LAN hardware and software without ever leaving your office! Just call IBM DIRECT, 9 am-5 pm, or fax 24 hours a day, and order reliable, high performance IBM adapters, workstation and LAN software, emulation programs, and cables direct.

Call IBM DIRECT for a range of products to increase your network's size, capabilities or both—all sold below IBM's suggested single-unit prices and ready for shipping. And if you buy at least \$1,000 worth of merchandise, a valuable Token-Ring Network Planning Guide is yours free (see details on back).

IBM DIRECT gives you:

- Genuine, high-quality IBM products
- Special IBM prices
- Products shipped within 48 hours
- 30-day money-back guarantee
- Full one-year warranty on hardware
- Unmatched service & support through HelpWare™
- Easy payment with VISA, MasterCard, or American Express.

If you'd like a free copy of our fall catalog, please call 1 800 426-2968.



IBM Token-Ring Workstation Adapters

**AWARD
WINNER**

These highly reliable adapters put network speed where you want it, when you need it. No wonder they're industry favorites. Two of the four let you transmit data at either 4 or 16Mbps. And our entire award-winning selection* runs the gamut from PC and low-end PS/2® cards to Micro Channel® PS/2 adapters.

*Two 1992 *Computer World* I/S Brand Preference Awards as well as the 1992 *LAN Times* Reader's Choice Award

IBM Token-Ring Workstation Adapters

	List	Now
16/4 Adapter/A (MCA) 74F9410	\$895	\$670
16/4 Adapter (AT BUS) 25F7367	\$895	\$670
Adapter/A 4Mbps (MCA) 69X8138	\$395	\$295
Adapter II 4Mbps (AT BUS) 25F9858	\$395	\$295

LAN Cables

These patch cables attach adapter cables to your 8228 Multistation Access Unit, while the Token-Ring Adapter Cable lets you connect an adapter to an IBM Cabling System wall jack or distribution panel.

LAN Cables

	List	Now
8-ft Patch Cable 8642551	\$44	\$30
30-ft Patch Cable 8642552	\$60	\$40
75-ft Patch Cable 6339134	\$120	\$90
150-ft Patch Cable 6339135	\$188	\$130
IBM T-R Adapter Cable 6339098	\$36	\$30



NetWare from IBM

Now you can create an open environment in which OS/2®, DOS, Windows™, Macintosh® and UNIX® users all share the same data and peripherals. V2.2 is ideal for work groups. V3.11 supports powerful 386 and 486 workstation and networking capabilities. And NetWare® Lite V1.0 is an easy-to-use DOS-based peer-to-peer network that's perfect for small businesses. (NetWare post-sale technical support is available for a fee.)

NetWare from IBM

	Users	3.5"	5.25"	List	Now
V2.2	5	85F0786	85F0787	\$915	\$630
V2.2	10	85F0788	85F0789	\$2,015	\$1,385
V2.2	50	85F0790	85F0791	\$3,535	\$2,430
V3 11	5	04G4098	04G4099	\$1,095	\$750
V3 11	10	04G4079	04G4080	\$2,520	\$1,730
V3 11	20	85F0794	85F0795	\$3,535	\$2,430
V3 11	50	04G4195	04G4196	\$4,995	\$3,440
V1 0 Lite		04G4193	04G4194	\$100	\$70

For
IBM
DIRECT,
call
1 800 426-2968

IBM PC LAN Program and LAN Support Program

By using these two programs in tandem, you can make sure all your DOS users are able to share data, applications, printers and serially attached devices. The IBM PC LAN Program contains both the server and requester modules needed to connect your workstations to networks. With IBM LAN Support Program, you get a common interface for NETBIOS, Ethernet Network DIX Version 2 and IEEE 802.3 applications.

PC LAN and LAN Support Program

	List	Now
PC LAN Program V1.3 3.5"84X0076	\$292	\$190
LAN Support Program 3.5"96X5678	\$69	\$45



IBM 8228 Multistation Access Unit

Use this rack-mounted unit to connect as many as eight network devices or to configure other IBM 8228 Multistation Access Units in your Token-Ring Network. When serially connected, it supports a maximum of 260 systems per token-ring. The unit uses copper cables and operates at 4 or 16Mbps.

IBM 8228 Multistation Access Unit

	List	Now
IBM 8228 Multistation Access Unit 6091014	\$630	\$475

3270 and 5250 Emulation

We offer options to attach programmable PS/2s and PCs to IBM ES/9000s, S/370s, AS/400s and S/3Xs. Some options are available as kits that come with all the cabling, software and documentation needed.

3270 and 5250 Emulation

	List	Now
PC 3270 Emulation Program Entry Level V2.0 91F8582	\$345	\$230
Personal Communications/3270 V2.0 91F8594	\$495	\$330
3270 Connection 74F3465	\$667	\$465
3278/79 Emulation Adapter 53F6425	\$667	\$465
Enhanced 5250 Display Station Emulation Program Convenience Kit V2.3 92F3273	\$686	\$515
Enhanced 5250 Display Station Emulation Adapter and Cable Kit 30F5622	\$510	\$385
System 36/38 Workstation Emulation Convenience Kit V10 69X6287	\$968	\$760
System 36/38 Workstation Emulation Adapter/A 69X6279	\$668	\$500
System 36/38 Workstation Emulation Attachment Cable 69X6293	\$70	\$50



Get a FREE Token-Ring Network Planning Guide with every order over \$1,000.

Order by phone: Have the information below ready when you call:
1 800 426-2968

Order by fax: Fill out the information below and fax to:
1 800 426-9734

Order by mail: Fill out the information below and mail to:
IBM DIRECT
Department PCM1
3000 East Valencia Street
Tucson, AZ 85706

Order our fall catalog:

- ☐ Yes, please send my free catalog to the address listed below.

Bill to/Ship to

Name _____		
Title _____		
Company _____		
Street _____		
City _____	State _____	Zip _____
Phone () _____		

- ☐ Charge to: ☐ VISA ☐ MasterCard
☐ American Express

Card # _____ Exp. Date: _____

- ☐ Check or money order enclosed. (See terms and conditions on reverse side.)

Ordering Information:

Item number	Qty	Price
		\$
		\$
		\$
		\$
Subtotal		\$
Sales tax		\$
Shipping & handling		\$ 6.00
Total		\$

Yours FREE with every order of \$1,000 or more:

The IBM Token-Ring Network Planning Guide* is a valuable resource that provides technical reference and educational information for both beginners and advanced IS professionals.

Offer expires 10/31/92 (limit one per order).



For our free fall catalog, call IBM DIRECT at 1 800 426-2968. The entire IBM DIRECT product line—everything from PS/2 and PC peripherals to LAN hardware and software—is now in one place: our fall catalog. To receive your copy, just call 1 800 426-2968 today.

Also, if you'd like to order IBM products from an IBM authorized dealer, you can call this same number and we'll help you locate the dealer nearest you.

For IBM DIRECT, call 1 800 426-2968



OS/2 2.0

This new 32-bit version of OS/2 breaks all the barriers to application compatibility. The result: for the first time ever, you can run DOS, Windows, and OS/2 applications from a single system. In fact, you can have all of the programs up and running at the same time. OS/2 is a superior platform for client/server environments. Plus, with the purchase of OS/2 you get free 60-day phone support.

NEW

OS/2 2.0

	Now
V2.0 3.5" 84F7586, 5.25" 10G2991	\$149
V2.0 Upgrade from DOS	
3.5" 10G5999, 5.25" 10G6000	\$99
V2.0 Upgrade from Windows	
3.5" 52G9956, 5.25" 52G9957	\$79

DOS Version 5.0

Here's the latest—and by far most powerful—version of the operating system that started it all. DOS 5.0 now offers better memory and file management, access to seven fixed disks, and an easy-to-use graphics-based shell, while taking up less space in conventional memory.

DOS 5.0

	List	Now
V5.0 3.5" 84F9775, 5.25" 84F9777	\$165	\$120
DOS Upgrade		
3.5" 84F9776, 5.25" 84F9778	\$85	\$60

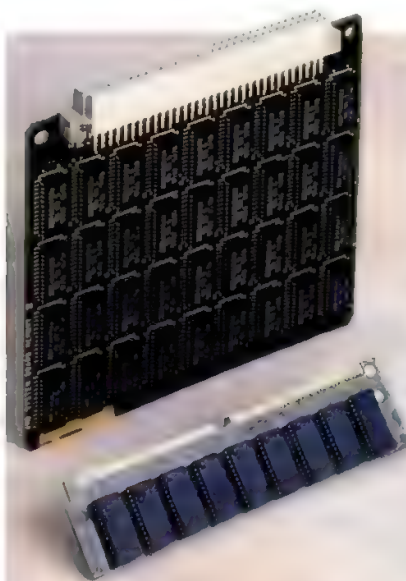


System Memory Options

If you want to use OS/2 to support personal productivity applications, multitasking or server functions, but need more power, try these options:

System Memory Options

Spd	Part No	PS/2 Models	List	Now
2MB				
70ns	6450902	25SX, 35, 40, 56, 57, P75, 90, 95	\$200	\$150
80ns	6450379	80, 111/121/311	\$183	\$135
80ns	6450608	25SX, 35, 40, 70-AXX/BXX, 90, 95	\$183	\$135
80ns	87F9856	70, P70, 80	\$600	\$450
85ns	6450604	25SX, 35, 40, 50, 55, 65, 70-E61/061/081/121/161 P70, 90, 95	\$183	\$135
4MB				
70ns	6450128	25SX, 35, 40, 56, 57, P75, 90, 95	\$367	\$275
80ns	87F9977	25SX, 35, 40, 55, 65, 90, 95	\$358	\$270
8MB				
70ns	6450130	25SX, 35, 40, 56, 57, 90, 95	\$867	\$650
80ns	6450129	25SX, 35, 40, 90, 95	\$733	\$550



* Binder not included

©AS/400, IBM, Micro Channel, OS/2, and PS/2 are registered trademarks of International Business Machines Corporation. Macintosh is a registered trademark of Apple. NetWare is a registered trademark of Novell, Inc. UNIX is a registered trademark of AT&T.

™ S/370, ES/9000 and HelpWare are trademarks of International Business Machines Corporation. Windows is a trademark of Microsoft Corporation.

Terms and conditions. This end-user offering and the prices and products in it are subject to change or withdrawal without notice. Dealer prices may vary 48-hour shipping subject to product availability. We reserve the right to limit quantities. Checks are subject to credit approval. Volume purchase discounts and all other promotions do not qualify for this offering. 30-day money-back guarantee does not include shipping and handling charges or applicable sales tax. Copy of the warranty and money-back guarantee statements available on request.

Printed in the U.S.A.

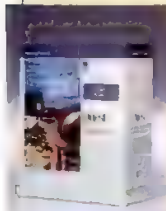
© International Business Machines Corporation, 1992

SQL Front Ends

FACT FILE

Quest, Version 1.2.0

Gupta Technologies Inc., 1040 Marsh Rd.,
Menlo Park, CA 94025; 415-321-9500



List Price: \$595 (includes stand-alone version of SQLBase)

Requires: 286-based PC or better, 2MB RAM, DOS 3.1 or later, Microsoft Windows 3.x

In Short: Quest is a Windows-based query and reporting tool that insulates the user from needing to

learn SQL. While it can also pass data gathered in queries along to other Windows applications for further analysis, its greatest strength is as a report writer



ON READER SERVICE CARD

ment instead of being tied to a network. Access to other SQL back ends is provided through routers and gateways sold separately by Gupta. An interactive SQL window is available for those who prefer typing in their queries directly or who need to do nested SELECT queries. Gupta also sells SQL Windows, which includes free runtimes, a report writer, and the SQLBase engine. Through add-on gateways and routers, SQL Windows can connect to Gupta, AS/400, Hewlett-Packard, IBM, Informix, Microsoft, Oracle, and Sybase SQL databases.

MENU-DRIVEN QUERIES

Quest uses menus to shield the user almost entirely from SQL. A series of dialog boxes, pick lists, and menus leads the user through the process of developing the query. Quest doesn't directly support joins or views from multiple data sources since it can only access one database at a time. The only way to create multidatabase joins is to query each database and save the results to a local database. Joins can then be done on the resulting tables in the local database. In order to access multiple data sources at once, the user has to start multiple instances of Quest and access a different database in each.

For further data manipulation, Quest provides math, string, date, and time functions that are accessed through dialog boxes. These functions can be used to create new columns in the result set to enhance analysis of data returned from a query. Once built, queries can be saved

on the client machine for reuse. Quest can also serve as a Windows DDE (Dynamic Data Exchange) client or server, which allows it to pass query results to another Windows program for analysis or charting. Quest has no built-in charting facility, but instead relies on links to applications like Excel through DDE.

A CAPABLE REPORT WRITER

Quest's greatest strength is its strong reporting capabilities. Reports are based on existing saved queries or local database files. Reports can be designed via the full-screen report painter, or dialog boxes can be used to set the report size and format. Either method gives access to options that include adding graphics borders to fields, controlling blank lines, and printing different fields in different fonts. Dialog boxes can be used to import bitmapped graphics for viewing or printing. Reports can be viewed on the screen prior to printing.

Quest has sets of aggregate and non-aggregate functions for massaging data within reports. The aggregate functions provide the user with statistical functions such as minimums and maximums, sums, and data counts. The nonaggregate functions are string functions for extracting portions of text fields or for converting fields between numeric and text formats. Quest's reporting functions also make it easy to create mailing labels or form letters that use the data in a database to fill in information.

Quest is a strong tool for creating queries and reports on SQL databases. It has no native programming language, but it can be indirectly programmed through DDE links to Microsoft Visual Basic programs or through macro languages such as those in Microsoft Excel or Word for Windows. Its lack of charting and limited analysis functions are compensated for by its DDE capabilities, which let it act as a query engine for other Windows apps. Quest is a good choice for those who do most of their work in Windows.

Channel Computing Inc.

Forest & Trees for Windows

BY JOE SALEMI

Channel Computing's Forest & Trees for Windows, Version 2.0d, is a powerful analysis tool. The standard version lets users combine and analyze data from common PC file formats, including dBASE, Lotus 1-2-3, Microsoft Excel, Q&A, R:BASE, and Paradox.



Data can also be brought in through Windows DDE (Dynamic Data Exchange) links. The client/server version can integrate data from a wide array of SQL databases. Forest & Trees, which is often used to create Executive Information Systems (EISs), is strictly an analysis tool; it doesn't allow users to modify data.

Forest & Trees offers many ways of getting at your data, but its best feature is its use of a tree metaphor in collecting data from various sources into data objects on the screen. With this feature, each object is a node in the tree diagram and contains the results of a query of a particular data source. The objects can then be analyzed and combined to create higher-level nodes.



Forest & Trees for Windows can monitor data thresholds in real time; the color of the individual data objects indicates the data's alarm status.

All the nodes ultimately connect to a root-level node that contains the summary analysis.

A WORKING METAPHOR

Perhaps the easiest way to describe how Forest & Trees presents complex data for analysis is by example. Suppose a business owner wants to analyze cash flow. The first step would be to query relevant data sources to build a tree with all the components of cash flow; each branch terminates in a node which contains the result set from a query on a different source. Once these lower-level nodes are created, the user can then create higher-level nodes by combining the lower-level nodes—for example, one node for in-

SQL Front Ends

come and one for money spent. Finally, the branch nodes could terminate in a root node where expenses are subtracted from income to show the company's overall profit or loss.

Each node's display object has a set of button icons that let the viewer navigate the tree to examine different data elements, create a graph or report on the data the object represents, or add pop-up notes to a node. Another way to navigate is by clicking with the mouse on a data object. Data can also be brought in and analyzed screen by screen, but it's the "tree" that makes this product unique.

ALARMS AND SCHEDULES

Forest & Trees provides the ability to update data on the screen in real time. This feature is built into a Forest & Trees application via a scheduling tool, which determines when the data in an object is updated. Automatic updating can take place after an end user-defined period of days, weeks, or months. If the application isn't running during a scheduled time, the updates are automatically performed the next time the app is loaded. In contrast, other packages (including LightShip, which is also reviewed in this roundup) require that the *developer* set up the scheduled events in advance.

Forest & Trees can also save a log of data prior to updates, which lets the user view and analyze the changes in a particular data object over a period of time. This

feature is useful for tasks like examining the balance on outstanding invoices.

An alarm feature lets users easily monitor the levels of critical variables (say, for instance, inventory) by color-coding the data displays. Green indicates the level is satisfactory, yellow means the quantity is approaching a cautionary level, and red means the data has triggered the alarm. Pop-up notes can be attached to the alarm to provide information on what the alarm indicates. This is a particularly powerful feature when used with the real-time updates.

Forest & Trees is simple enough for the novice to use efficiently, yet powerful enough to perform complex analyses. Its data analysis capabilities are among the best we've seen. If you need a user-friendly but powerful analysis tool that can integrate data from many different sources, you'll want to take a look at Forest & Trees.

Pilot Software Inc.

LightShip and LightShip Lens

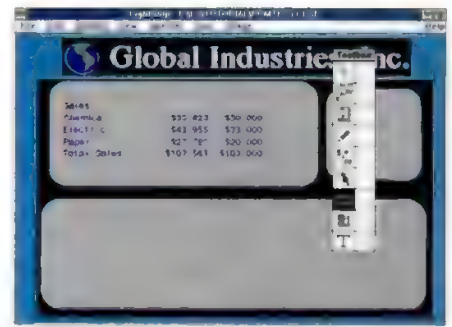
BY JOE SALEMI

LightShip, Version 3.01, a Microsoft Windows-based data analysis package from Pilot Software, is primarily designed for creating in-house visual analysis applications, especially Executive Information Systems (EISs). The single-user version uses Windows' DDE (Dynamic Data Exchange) facility to acquire and display ASCII and Windows-based data. The LightShip Lens module gives LightShip access to PC-based databases such as Excel, Paradox, and Xbase, as well as SQL databases from Microsoft, Novell, Oracle, and Sybase. Though users can use LightShip to update information in source files, the package's primary function is to provide a tool for visually analyzing database information.



CLICK AND CREATE

LightShip uses a visual development environment with tools to create screen and data objects. The basic package can use directly entered data, a text file, or a Windows DDE link as data sources. The Lens module, needed to gain access to other



LightShip's object-oriented development environment allows the application developer to combine data and graphics for visual analysis.

data sources, is automatically invoked as a data source when a new document object is created.

Data objects, which display data from a single source, can be placed anywhere on the screen. Unlike Channel Computing's Forest & Trees, which can combine data from disparate sources, the only way to compare data from different sources with LightShip is to create an object for each source and manually compare them.

LightShip guides the user through query formation via pop-up windows and pick lists for specifying the data source, fields of interest, and query conditions. Developers can designate screen objects as "Hot Spots" and assign actions to them. Clicking on a Hot Spot allows users to "drill down" through the selected data object, viewing documents associated with that particular item in a separate window on the screen. A Hot Spot can also be used to perform actions such as calculations.

With Lens loaded, users select the appropriate query conditions from a menu and the SQL code is generated automatically. While it is rarely necessary, experienced users who wish to bypass the menus can do so. LightShip also provides hooks for developers to write external routines to enhance LightShip's capabilities. For example, if access to an unsupported back end is needed, it is possible to write and integrate an external routine to do so.

GETTING THE PICTURE?

One of LightShip's most convenient features is its ability to integrate graphics with data. .PCX, .BMP, and Clipboard images can be used as backgrounds to highlight different areas of the screen or

FACT FILE

Forest & Trees for Windows, Version 2.0d

Channel Computing Inc., One Harbour Plaza, #500, Portsmouth, NH 03801; 603-427-0444

List Price: \$495, client/server version, \$1,495, each additional user, \$395 (for both versions)

Requires: 2MB RAM, 6MB hard disk space, Microsoft Windows 3.x

In Short: Forest & Trees, a data access and analysis tool, allows the users to combine and examine

data from a variety of sources. Its many unique end-user features make it an especially appealing product for Executive Information Systems applications.

ON READER SERVICE CARD

SHOULD A WINDOWS DATABASE BE EASY, RELATIONAL OR COMPATIBLE?

Approach™ for Windows™

It's the only database that gives you ease. Relational power.

And compatibility. All in the same box. Which is why it's become the best-selling Windows database almost overnight.

Winner



Approach for Windows wasn't just the best database at COMDEX/Spring 1992. It was the best software. Period.

And why it was named best software at COMDEX/Spring 1992.

It's so **easy**, you can build and manage a

database with absolutely no programming. In fact, Dennis Allen, Editor-in-Chief of BYTE, said "Every database claims to be easy to use.

Approach for Windows really is."

Even new users can generate reports, forms, and mailing labels like these. By using a mouse instead of a manual.

At the same time, it has so much **relational** power you can run your entire business on it.

ABSOLUTELY.



"Approach for Windows is an amazing product with features galore...You'll be as wowed by it as we were."—PC Computing

From contact management to department budgeting; from processing accounts receivable to analyzing and reporting on corporate data. We even made it 100% **compatible** with all your network data. With our PowerKey™

Technology, you can work with dBASE®, Paradox®, and Oracle® SQL data in its native format. And even mix data from all three on the same form or report. It's also plug-and-play compatible with any Novell®, Banyan®, Microsoft® or LANtastic® network.

So if you're waiting for the database of the 90s, we'd like to leave you with exactly one thought. It's here.



APPROACH FOR WINDOWS
Approachable. Relational. Compatible.



APPROACH
SOFTWARE CORPORATION

For information, or to order, call your local dealer or
1-800-APPROACH.

■ Standalone SQL Engines

by Jonathan Zuck

SQL database systems built on the client/server model are generally used on networks. The database engine resides on a server, and the front-end access tools reside on client workstations. While a network is the perfect environment for a system that's up and running, it can be less than ideal for development work. A standalone engine such as the popular DOS version of XDB spells relief during the development process on a number of fronts.

Many things can go wrong during the development process. At the very least, as tables are being normalized and optimized there is heavy access to the server, which can compete with other client applications. Under the worst circumstances, bad queries generated during development could tie up the server and cause work disruptions elsewhere on the network.

Another consideration is the mobility of the development process. It is inconvenient for programmers to be tied to a network for development. With a standalone engine, development can also take place at home or on the road.

Standalone engines are not strictly for development; they can provide a powerful vehicle for local data access. Even when the data is not shared by multiple users, there are data management and integrity benefits to be gained by accessing data via an engine rather than accessing the files directly. With the advent of multitasking on single-user machines, it is possible to have more than one application accessing the same data at once. Concurrency is handled better by a central processing engine than by competing applications.

There is also a scalability benefit to standalone SQL engines. In some situations, it is useful to be able to run a networked database application on a local PC; standalone engines can provide this scalability. For example, a salesperson might need to download contact data to a notebook computer

and access the data on the road. The ability to run the same application on the network and on a notebook can be a major time convenience.

Finally, although they are called "standalone engines," these products can usually support multiple users over a network using the file/server rather than the client/server architecture. Although it is inefficient, it can be an inexpensive way to get a networked database up and running before investing in expensive client/server hardware.

THREE VARIATIONS ON THE THEME

Standalone engines can take three different forms. One common form is as a set of static link libraries (.LIB files); there are versions for both DOS and Windows. For example, Ocelot's Ocelot2—The SQL! comes in the form of a .LIB file that is linked into your final executable. This method has the advantage of limiting the number of files that must be distributed with the application. Also, because the linker extracts only those modules needed by the program, the total memory required is minimized.

Another possibility is to use a DOS-hosted engine that runs as a TSR on the client workstation and is accessible via interrupts. This method more closely mimics the networked architecture. The standalone versions of Gupta Technologies' SQLBase Server NLM and Oracle's Server for NetWare engines are two examples. In both of these products, the developer is shielded from direct interrupt calls via a library of alias functions that match those found in the client/server version of the engine. The primary benefit of this approach is smaller executables.

Finally, under Windows, standalone engines such as Quadbase-SQL/Win are shipped in the form of DLLs (dynamic link libraries). This offers several advantages, including simultaneous multiapplication support and asynchronous queries.

WHICH SHOULD YOU CHOOSE?

The standalone SQL engine you need depends largely on whether you need to develop an application that will ultimately run on a network in a client/server configuration, or one which will be used to access local data on a PC.

If you plan to move your application to a network, then upward scalability will be your prime consideration; the API for the standalone engine should be as similar as possible to the API for the networked version. To this end, a growing number of SQL back-end vendors now sell standalone versions of their database engines for DOS and Windows development. There are standalone engines from Gupta, Ingres, Oracle, and XDB. (There is not yet a standalone version of Novell's most recent release of NetWare SQL.)

Third-party products are a good choice if you intend to develop for multiple database formats and back-end engines, or if you don't need the power of the client/server architecture. Ocelot2, which is available for both DOS and Windows, is one of the smallest and fastest standalone engines, especially when the precompiler is used. Ocelot2 also provides a high level of DB2 compatibility, second only to XDB, which is a much slower performer. Perhaps the most powerful standalone engine for use under Windows is Quadbase-SQL/Win. It is fast and flexible, with powerful concurrency and network support. Both of these products are especially well suited for standalone or file/server applications.

Q+E Database Library from Pioneer Software, which supports numerous back-end formats, uses a proprietary API for accessing data. This lets Database Library provide fuller access to back-end feature sets. While it is especially good at multifunction data access, its standalone performance is not as strong as that of Ocelot2 or Quadbase. □

In Celebration
of Our Unbelievably
Low Prices,
We Bring You Yet Another
Unbelievable Act
Of Lowness.



*To Bruno Zehnder and Heather May goes the prize
for the lowest wedding ever: in an ice cave, 15 ft.
below ground, in Antarctica, at 15° F below zero.*

COMPUDYNE

THE LOWEST OF THE LOW PRICES. GUARANTEED.

And Now The 'Who', 'What' and 'How Much'



Compudyne is probably the fastest growing PC company in the history of the industry.



"Who?" Compudyne™ is the PC manufacturing and direct marketing arm of CompUSA™—The Computer SuperStore (NASDAQ symbol: CUSA)—inventors of big volume, deep discounting PC retailing, and the largest chain of computer super stores in the country. Compudyne manufactures top quality,

fully-supported computers as available from only the largest PC manufacturers at prices typically found only at garage shop clone houses. Result? We're already one of the largest direct PC companies in the country and probably the fastest growing PC company in the history of the industry!

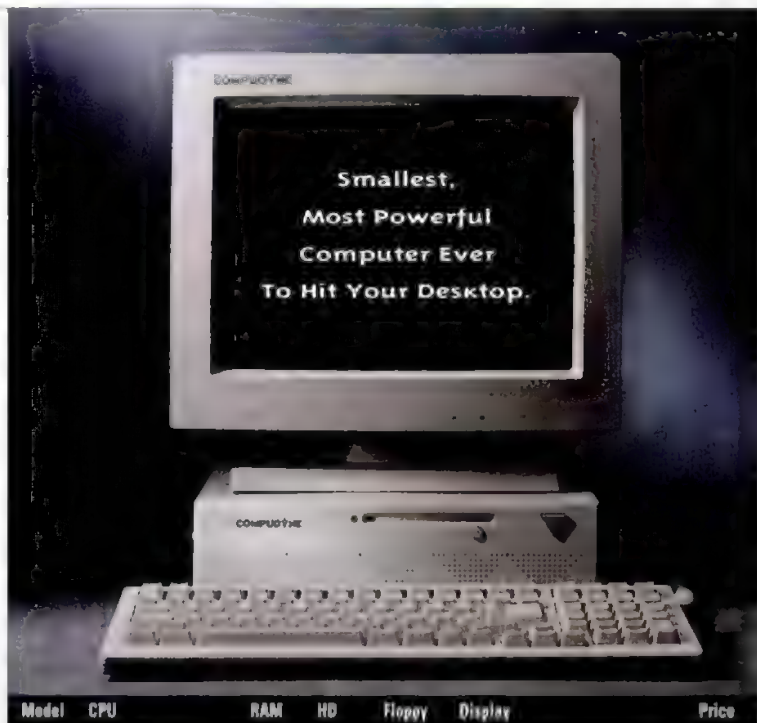
Heaven For Small Offices!

- Unique small footprint (12.25" x 15" x 3.5")
- 3 configurable expansion i/o board slots
- Built-in 9600 BPS send/receive fax modem and 2400 BPS data modem
- Internal 3 1/2" hard drive with up to 400 MB capacity!
- 3 1/2" standard (5 1/4" optional) floppy drive
- 5 1/4" drive bay accepts CD ROM, or other 5 1/4" devices
- Built in serial (1), parallel (1) and game ports (1)
- Built-in high performance super VGA adapter with 1024 x 768 resolution and 256 color support
- Preloaded with Windows® 3.1 and MS DOS™ 5.0
- Microsoft compatible serial mouse
- FCC Class B certification

A Software Spectacular...

This giant bundle of Windows™ software can be pre-loaded into your new Compudyne system! **A \$1,500 retail value!** Call for prices!

- **Spreadsheet/Database:** Lotus® 1-2-3®
- **Wordprocessing:** Lotus® AMI Pro™
- **Desktop Publishing:** Micrografix® Windows Draw™
- **Personal Finance:** Intuit Quicken®
- **Personal Information Manager:** Polaris PackRat™
- **Information Utility:** Prodigy®
- **Terminal Communications:** DCA Crosstalk®
- **FAX Management:** Delrina® WINFAX™



Model	CPU	RAM (MBs)	HD (MBs)	Floppy	Display	Price
3SX/25	Intel 386/SX-25 MHz	1	40	1.44	640x480 Resolution 52 14" VGA Color Monitor	\$899 \$33/mo*
3DN/33	Intel 386/DX-33 MHz	4	105	1.44	1024x768 Resolution 28 14" SVGA Color Monitor	\$1,299 \$48/mo*
4DX/33	Intel 486/DX-33 MHz 128K Aux cache	4	130	1.44	1024x768 1MB video RAM 28 14" Non-Interlaced Multi-sync Color Monitor	\$1,799 \$67/mo*

THE MOST INCREDIBLE
BUSINESS BUNDLE EVER!

CALL FOR PRICES!

COMPUDYNE



*Leasing arranged through Leasing Group, Inc. payments based on 36 month open-end rate. **Does not include Windows 3.1 or mouse.

EXTRA
VALUE

intel
inside

DIAL TO SAVE DOLLARS
1-800-932-COMP (2667)

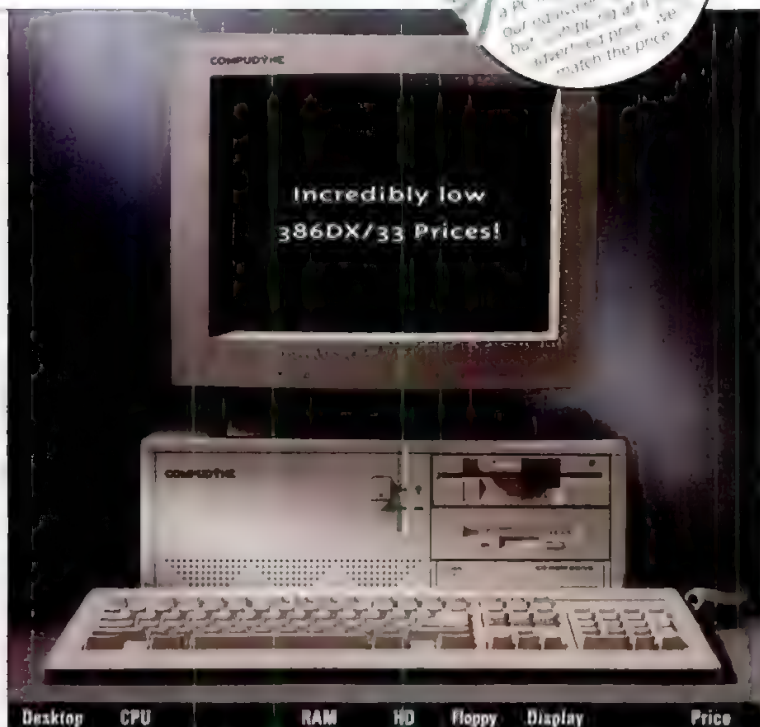


Behind The Nation's Lowest PC Prices.

"What?" We sell everything. Besides the selection of desktops and system options you see here, we sell thousands of top quality branded PC products, which we can build into the system of your choice.



"How Much?" We guarantee that our prices are the lowest of any currently advertised. If by chance another manufacturer got a late-breaking reduction to press a few minutes before us, rest assured, we'll beat it.



Desktop	CPU	RAM	HD	Floppy	Display	Price
386SX/25	Intel 80386SX-25 MHz	1MB 32 max	50 MBs	1.2 or 1.44	16 bit SVGA card 14" 640x480 VGA Color Monitor	\$899** \$33/mo*
386DX/33	Intel 80386DX-33 MHz	2 standard 32 max	80 MBs	as above	as above	\$999 \$37/mo*
486SX/25	Intel 80486SX-25 MHz Built-in 8K CPU cache	as above	105 MBs	1.2 & 1.44	16 bit SVGA card 14" 1024x768 SVGA Color Monitor	\$1,299 \$48/mo*
386DX/33 CACHE	Intel 80386DX-33 MHz 64K CPU cache	4 standard 32 max	105 MBs	as above	16 bit SVGA card w/ 1MB video RAM & Hi-Color Support 14" 1024x768 SVGA Non-interlaced Multisync Color Monitor	\$1,499 \$56/mo*
486DX/33 CACHE	Intel 80486DX-33 MHz 128K CPU cache	4 standard 64 max	130 MBs	as above	as above	\$1,799 \$67/mo*
486DX2/50 CACHE	Intel 80486DX2-50 MHz 128K CPU cache New Double Clock CPU	as above	130 MBs	as above	as above	\$1,999 \$74/mo*
486DX/50 CACHE	Intel 80486DX-50 MHz 128K CPU cache True 50 MHz CPU	8 standard 64 max	210 MBs	as above	as above	\$2,499 \$89/mo*
486DX2/66 CACHE	Intel 80486DX2-66 MHz 128K CPU cache New Double Clock CPU	as above	210 MBs	as above	as above	\$2,999 \$111/mo*



All Systems Feature...

- Rugged, aesthetic Macintosh® style case on a steel frame
- Microsoft® Windows 3.1 installed
- Microsoft compatible serial mouse
- Artisoft's LANtastic® LAN
- 101 AT-style keyboards
- Built in serial (2), parallel (1) and game (1) ports
- 8 i/o board slots
- 200 watt power supply
- 5 Disk drives: 3 external 5.25" bays, 2 internal 3.5" bays
- FCC Class B cert.; U/L listing

Options, Options, Options...

- Displays: Mono or color VGA; 1024 and 1280 interlaced or non-interlaced; 14" to 20"
- Hard Drives: 40; 80; 105; 120; 211; 483; 680 MBs or 1.2 GBs
- Internal CD-ROM (inc. Groliers Encyclopedia, Toolworks, Reference Library and PC-SIG)
- Internal FAX/Modem: 9600 bps send/receive fax; 2400 bps modem; inc. WINFAX and Quicklink.
- And many more!

ORDERING

- ▶ 1-800-932-COMP (2667)
- ▶ International callers dial:
1-214-702-0055
- ▶ 24 hour fax: 1-214-702-0300



- ▶ 8am-7pm (CST) M-F, 9am-5pm (CST) Sat.

SUPPORT

- ▶ Toll-free technical support
- ▶ On-site service for desktops†† and overnight replacement for portables.

WARRANTIES

- ▶ 30-days, no questions asked, return policy.
- ▶ 1 year limited warranty.



4/14/92
LANtastic
ver 4.1



You can also buy these neat products at the same prices exclusively at
COMP USA



as a Hot Spot indicator. LightShip also gives the developer complete control over the screen palette; color can be used to highlight blocks of data or sections of a window.

Bar, line, area, and pie charts are available; users access the pertinent information, select the data they wish to see, and describe the chart in a dialog box. Charts showing information from different areas of the same database may be overlaid for easy comparison.

FACT FILE

LightShip, Version 3.01, and LightShip Lens, Version 3.0

Pilot Software Inc., 40 Broad St., Boston, MA 02109; 800-944-0094, 617-350-7035

List Price: LightShip, \$795, with Lens, \$1,190. For 25 users: LightShip, \$19,900; with Lens, \$29,900 (includes on-site consulting)

Requires: 2MB RAM (4MB recommended), 5MB hard disk space, Microsoft Windows 3.x

In Short: LightShip is a development tool for creating Executive Information Systems. Its strengths lie in its visual analysis and graphing capabilities; LightShip's greatest weakness is that only one data source can be accessed at a time

ON READER SERVICE CARD

One of the important EIS-type features included in the product is variance reporting. You can set up a reporting system that allows users to set thresholds at which data values should be displayed differently. For instance, an inventory ledger might show understocked products in a different color. This capability is different from a true alarm function (such as that in Forest & Trees) because it doesn't automatically pop up an alert; alerts must be explicitly coded by the developer.

The package includes debug facilities that let the developer test run the application while tracing the values of defined variables and the actions being executed. Traces can be printed or saved on-disk.

LightShip's biggest drawback is that it cannot create links between different data sources for analysis; the one-file limit is a severe restriction. Still, its simple, visually oriented approach makes it a useful analysis tool.

Software Publishing Corp.

InfoAlliance for Windows

BY JOE SALEMI

Software Publishing Corp.'s InfoAlliance for Windows, Version 1.10, is billed as a "data-source integrator": Its primary function is to give users a way to integrate and examine data from multiple sources within a single data view or report. To that end, InfoAlliance users can access data from its own OS/2-based server with its proprietary data format, or they can have transparent access to IBM Extended Services, Microsoft SQL Server, and Xbase databases. Data can also be imported from ASCII, Lotus 1-2-3, and Professional File file formats.



InfoAlliance front ends (clients) are available for OS/2 1.21 or later and Windows 3.x for \$495. The OS/2 version requires InfoAlliance software on both the front end and back end; the Windows version, reviewed here, can be installed as a standalone client.

A MODULAR APPROACH

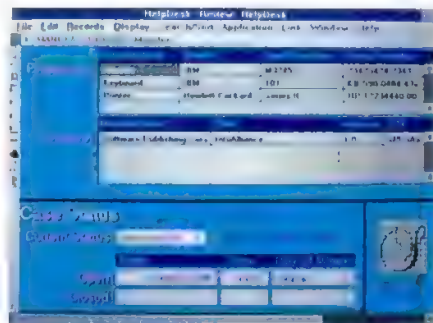
In its entirety, InfoAlliance is a system that consists of three modules: the front-end product itself, the gateway to IBM Extended Services and Xbase, and the SQL Server connection. The front-end module provides a host of forms-based tools that let the user create and use data forms that can contain multiple fields from multiple databases. The forms are based on InfoAlliance database "views," which can link tables from any of the different data sources into a single view.

Forms and reports begin as a data view that gets built up through dialog boxes, menus, and pick lists; data fields in the view can come from any of the supported data sources. The form or custom report is then designed using the fields in the view through the graphical full-screen painter function. Quick reports can be easily created from an existing form, and InfoAlliance includes a number of predefined standard mailing-label formats.

There are no built-in charting functions, but InfoAlliance can export data in the Harvard Graphics format for charting

by that program. It can also act as a Windows DDE server to other applications, which lets the user create a link between InfoAlliance and applications such as Microsoft Excel where the data can be further analyzed. InfoAlliance itself has only minimal analysis capabilities, provided through a few aggregate functions such as Minimum, Maximum, and Count. While InfoAlliance does a good job of implementing forms-based systems, you may want to turn to programs such as Forest & Trees or LightShip for more elaborate user interfaces.

The second module is the OS/2-based Network Data Source Integrator (NDSI) engine. At \$2,495 for an unlimited number of users, it's the InfoAlliance gateway, data dictionary, security system, and transaction manager all rolled into one. NDSI runs on any 386 or better with OS/2 1.21 or later, and supports workstation access across IBM LAN Server, Microsoft LAN Manager, and Novell NetWare



The modular, form-based interface of InfoAlliance for Windows is capable of showing information from multiple data sources.

LANs. While it ups the price of InfoAlliance dramatically, the module is the only way to gain access to databases other than Microsoft SQL Server.

The NDSI server supplies user log-on security through user IDs and passwords, which are managed by the included OS/2 or Windows server administration program. The administration program also lets the database administrator monitor server activity, such as the number of open files and which files are being accessed by which users.

A third module (the newest in the group and required only if you need to access SQL Server) is called the Connector to SQL Server. It runs either with a standalone InfoAlliance Windows front end or as part of the NDSI server to give

SX / Now!
Processor Upgrade

New 486/Now!
Gives Your 386DX-based
IBM or Compaq
486SX/25 or 486DX/33
Power & Performance

Rattle Your Window Panes.

"...SX/Now! is the undisputed performance champ..."

PC Magazine, Oct. 29, 1991

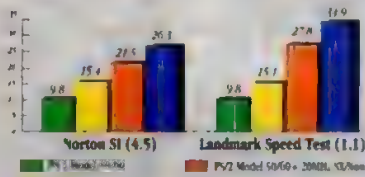
"...SX/Now! upgrades offer polish as well as good fit, performance and compatibility..."

PC Week, Aug. 26, 1991

Want to make your Windows really shine? For Windows enhanced mode, multitasking and memory management, **SX/Now!** 386SX processor upgrades from Kingston are the way to get optimum 386 performance without replacing your 286 system

Our new **Am386SX 25MHz CPU** upgrade increases the processing performance of your 286 system by over 350%*. As with our 20MHz version, we combine a microprocessor with a 16KB memory cache and on-

board clock plus support for a 387SX coprocessor—all on a module that doesn't take up or interfere with an expansion slot.



What about compatibility? **SX/Now!** supports a wide range of 286 based systems, DOS 5.0, Windows and OS/2. **SX/Now!** versions are certified by the National Software Testing Lab for full hardware and software compatibility.

And with Kingston's five year warranty, you know that an **SX/Now!** upgrade won't let you down.

CIRCLE 106 ON READER SERVICE CARD

Now Shipping SX/Now! for:

IBM PS/2 (all 286-based models)
IBM AT & XT/286

AST Premium 286 & Bravo 286

HP Vectra ES/12 & 286 ES

Compaq DeskPro 286 & Portable III

NEC PowerMate 286 Plus & Portable Plus

AGI 1800A, 1800B & 1800C

Epson Equity IIe & II Plus

MANUFACTURED BY
Kingston
TECHNOLOGY CORPORATION
17600 Newhope Street, Fountain Valley, CA 92708

(800) 835-6575

(714) 435-2600

FAX (714) 435-2699

All trademarks mentioned are property of their respective holders *As judged by the Landmark Speed Test 2.0

SQL Front Ends

FACT FILE

InfoAlliance for Windows,
Version 1.10

Software Publishing Corp., 3165 Kifer Rd.,
P.O. Box 54983, Santa Clara, CA 95056-
0983; 408-986-8000

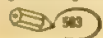


List Price: \$495

Requires: 386SX-based PC or better, 4MB RAM, 6MB hard disk space, VGA display, Microsoft Windows 3.x

In Short: InfoAlliance provides the ability to access data from multiple sources simultaneously, including

from its proprietary client/server back-end. No programming is required to create complex applications.



ON READER SERVICE CARD

multiple users access to SQL Server data. The Connector handles all the translations to make SQL Server databases appear as InfoAlliance databases to the users; it also has the ability to copy the SQL Server data to any of the other supported data sources. InfoAlliance's Connector even gives the user the ability to create multitable views from tables residing on different SQL databases, integrating the different tables into one form or report.

PROTECTING USERS FROM CODE

The InfoAlliance development environment shields users and developers from having to write program code; in fact, there's no programming or script language at all. Unfortunately, applications are stored in a proprietary format and can't be created or edited outside of InfoAlliance. The application file format, however, is compatible with both OS/2 and Windows versions.

InfoAlliance uses Windows' GUI capabilities to the fullest. Bitmapped graphics can be included in a form or report, and different sections and fields can be set apart from others with different fonts and colors. Data can be viewed and manipulated through either a form or a table window, and multiple data windows can be open at the same time, which lets the user cut and paste data from one table to another for queries or updates.

InfoAlliance's greatest strengths are its native client/server abilities and its ability to integrate data from a number

of different sources into one view for analysis. It's an excellent choice for those who already have large databases in a number of different formats and want to be able to combine data from those databases without having to convert them all into a single format.

JYACC Inc.

JAM/DBi for DOS

BY JONATHAN ZUCK

The JAM development system runs on over 100 hardware platforms and 10 operating systems; the database add-on, called DBi, supports over 20 SQL back-end engines. Together, JAM and DBi provide the strongest cross-platform, cross-database support of any front-end tool we're aware of. We have reviewed the DOS version of JAM/DBi, Version 5.0. A Windows version is in limited distribution and still undergoing revisions; JYACC would not provide us with a review copy.

JAM is a complex system that takes some time to learn; this tool is for serious developers only. But you need not fear being left to sink or swim on your own. JAM has excellent documentation and extensive, context-sensitive on-line help available anywhere in the development environment. If that fails, JYACC's responsive and competent technical support staff will provide quick assistance.

MANAGING MULTIPLE PLATFORMS

JYACC products' user interfaces are not always intuitive for either the developer or the end user. Because of JYACC's emphasis on cross-platform support, there has been no attempt to comply with the standards of any individual platform. For example, the DOS version is not CUA-compliant.

This is not to say that there aren't differences in the interface elements supported by JAM on different platforms. There are,



and these differences can make it difficult to develop cross-platform applications. For example, the Windows version supports pull-down menus but the DOS version does not—at least not directly.

In other instances, enhancements have been added to some platforms but not to others. Color is a concern because the same color scheme may not work across all operating environments. With the Motif version of JAM, you can define "logical colors" like ListBoxText from within the interface builder, and these logical colors can be mapped to different colors under different environments. This capability is not yet available with the DOS or Windows versions of JAM.

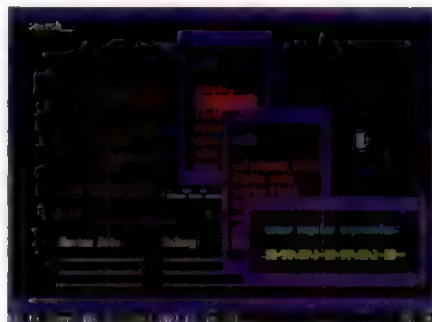
THE DEVELOPMENT ENVIRONMENT

JAM/DBi is not for the casual user. You must compile and link the development environment to use it for the first time, and again whenever you add or upgrade components. The JAM development system is highly modular, with separate, replaceable pieces for database access, report writing, and GUI design.

Most JAM development work takes place in JXFORM, an interactive screen designer. Each field added to the screen is an independent entity with unique properties and associated events. Menu and pop-up fields are easily created. JAM also has a feature called array fields, which lets you create a scrolling list box by simply specifying the total number of text lines and the total number of visible lines. You can copy this definition horizontally to create a group of lists that scroll together.

JAM supports a data dictionary where you can store selected fields and their attributes—including the data the fields contain—for later use. This feature makes it easy to create pop-up dialog boxes that fill data into like-named fields. At any time during screen building, you can enter "test mode" to try out the screen and its features.

JAM comes with a utility to generate a report from the screen definitions



The DOS-based JAM/DBi system uses a flexible (but not CUA-compliant) user interface scheme for multiplatform, multiformat front-end development.



Mac is Mac and Windows is Windows and WordPerfect® plays no favorites. If Macintosh is your idea of what a computer should be, WordPerfect has a powerful, elegant System 7 word processor that only proves you right. If Windows is more to your liking, WordPerfect has a best-seller that makes the most of it. Yet surprisingly, WordPerfect for Mac documents are compatible with WordPerfect for Windows. Which means that an office divided against itself *can* stand, after all.

WordPerfect

FOR INFORMATION CALL 1-800-526-5164

The Colormate



*At NEC we make
a full line of
advanced monitors
ideally suited to the
Colormate family.
The MultiSync®
4FG™ 5FG™ and
6FG™ all deliver
exceptional clarity
and they all
feature our
amazing AccuColor™
Control System.*

The more presentations you have to make, the more you need the NEC Colormate™ PS printer. Because the Colormate pays for itself in no time. Legally. For as little as 49¢ a page. Imagine color on paper or transparencies at only a tenth of the cost of sending work out. And what's more, at just \$4,799 (MSRP), it's the lowest priced PostScript™ language printer on the market.

The colors are as dazzling as the figures. Everything from soft pastels to brilliant primaries. And all Pantone® approved. 300 dpi graphics means sharp, clear output. The Colormate PS integrates readily with any network, PC or Mac®. Plus, it's compatible with all popular graphics software.

Imagine all the freedom and control creating presentations in house will give you. Last-minute changes can be made in minutes. Just think, for a few dollars you can have output that looks like a million bucks.



PS pays for itself.



For information, dial 1-800-NEC-INFO (in Canada, 1-800-343-4418). Or via fax, call NEC FastFacts™ at 1-800-366-0478 and request # CMPS (2677). NEC GSA # G500K91AG55241

Because  is the way you want to go.

NEC

CIRCLE 156 ON READER SERVICE CARD

■ Transparent Data Access: *Cross-Platform, Cross-Format*

by Jonathan Zuck

With the growing popularity of SQL databases on virtually every platform imaginable, the use of proprietary APIs (application programming interfaces) for data access and manipulation presents more and more of a problem. A front-end program developed for use with one vendor's back-end engine cannot be used with another's, and application developers must spend costly time learning many variants of the same thing.

Transparent data access—the ability to access multiple back ends from a single front end—provides numerous conveniences, but it's important to recognize that this is not a perfect solution. It is next to impossible to create an application that is optimized for more than one SQL back end. For example, if you were using IBM Extended Services, you would want to take advantage of its OS/2-based DLL (dynamic link library) capability, but you won't find this feature elsewhere.

THE COMPONENTS OF AN API

An API is nothing more than a syntax (a standard set of functions) that is used by developers for a particular task. An API used to access SQL engines is a set of functions that standardize communication with SQL back ends. With the exception of precompiling, the API has little or nothing to do with a particular SQL dialect, but rather the manner in which SQL is passed to the engine and results are retrieved.

For example, one engine might have a three-parameter function called dbEXEC for sending SQL commands to the engine. Another engine might have a function with a similar purpose called SQLRequest that takes two parameters. In the case of the function with the third parameter, results (per-

haps only partial) will be retrieved as part of the call to send the SQL statements. With the other function, though, a separate call is required to retrieve results. These seemingly minor differences can cause a great deal of frustration if you're a developer attempting to build a back end-independent application.

The simplest road to transparent data access is to connect to the same vendor's SQL engine on different platforms. This is relatively simple because the API remains the same and only the platform changes. Vendors that provide versions of their products for multiple platforms (and most do) generally provide communications software for accessing data stored on other platforms. A company that uses one vendor's SQL engine on all of its computers will have an easier time integrating its databases than will a company which uses products from multiple back-end vendors.

The reality, however, is that most companies use software from more than one vendor. A company's database software is usually purchased piecemeal over time rather than with an overarching grand plan, and most companies do not have the luxury of throwing out their existing software to adopt a new, standardized system on all platforms. In general, transitions to new database software are made incrementally, if they are made at all.

THE GATEWAY SOLUTION

Gateways, software that provides transparent access to the database engines of many vendors, are sometimes developed by database vendors themselves in an effort to bring more developers into their fold. Gupta Technologies builds gateway features into its engines that enable developers to write to Gupta's

SQLBase API but specify that these calls should be "passed through" to another SQL engine.

Most gateways, though, are provided by third-party vendors. Micro Decisionware has chosen the Microsoft/Sybase dbLIB API as the API of choice for mainframe connectivity. Using Micro Decisionware's DB2/Gateway, it is possible to move an application to DB2 or another format without even recompiling your code! It operates by intercepting calls to dbLIB and translating them to calls to the host system.

Standardizing on an existing API is a good approach because then at least one engine's features will be fully accessible. But there are cross-format advantages to using a nondedicated API. Pioneer Software has developed a proprietary API for accessing an enormous number of SQL engines and non-SQL database formats. Its Q+E Database Library is available under Windows and OS/2.

Enterprise Data Access/Structured Query Language (EDA/SQL), from Information Builders, also provides its own API and drivers. But this vendor aims its marketing efforts at companies developing data access tools, rather than at individual developers. Information Builders has reached agreements with Apple, IBM, and Microsoft, among others. The goal is to provide a uniform, relational view of data, regardless of its source or organization. While many gateway products support multiple back-end platforms, EDA/SQL is unique in the number of front-end platforms that support it.

SQL ACCESS STANDARDIZATION

If Information Builders or Pioneer had the marketing muscle to pull it off, one of their products might become the model for transparent data access. As is

SQL Front Ends

natural with such things, however, the emerging standards for SQL engine access are coming from the big guys: Microsoft and Borland. Rather than evolving from an actual product, these committee-designed standards exist only on paper. It will be the responsibility of each vendor to create compliant software.

Microsoft's proposed standard is called ODBC (Open Database Connectivity); the Borland version is called ODAPI (Open Database Application Programming Interface). ODBC has been more fully specified at this time than ODAPI and is dedicated to SQL, while the more ambitious ODAPI standard is further off but intended to support nonrelational data access and object-oriented database technology. Both specify standards to provide the following:

- A set of standard function calls (an API) to allow applications to connect to a database management system, execute SQL statements, and retrieve results. It would be the responsibility of each engine vendor to release a driver that complies with the standard. The drivers will take the form of "wrapper" libraries that translate the vendor-specific calls into the standard API. This will preserve the utility of existing applications that call the old API.
- A specification of SQL syntax and supported data types. One of the major requirements for successful cross-engine interoperability is the standardization of SQL language components. This will probably be the greatest stumbling block to transparent data access because of the need to preserve existing functionality.
- A standardized set of error codes and standardized error-handling procedures and behavior.

If the computer industry as a whole accepts one of the standards, the number of applications supporting access to SQL databases will mushroom. Providing access to so many different standards is a developer's nightmare; a single API would greatly ease the task. □

of a particular application. In addition, there is a utility that generates an ASCII version of the form and all its field attributes to use with your favorite version control or CASE tool.

PROVIDING THE LOGIC

Once you have laid out your screen, you can specify event handlers for each user interface element. For example, you can specify what actions take place when a user enters or exits a field. Most event-handler code will be written in the JAM Programming Language (JPL), a p-code-compiled language that is platform-independent and easy to migrate to different operating environments. JPL includes string functions, looping, and conditional flow control, and is adequate for most purposes.

You can also link prewritten C routines into the development environment, but this is inconvenient since the C code must be written and tested separately. To incorporate C, you must build an .OBJ or .LIB file of the C routines you wish to use and relink the development environment itself with your new code. You can then call the C functions directly from the validation or event-handler menus, or from within JPL. While this seems rather clumsy at first, if you design your C functions well they can be reused, so the link process need not take place very often. Also, having low-level access to the runtime system makes the development system especially extensible.

You build a JAM application by linking libraries provided by JYACC, any C functions you may have written, and JAM forms. You have the option of building either or both of two executables: one which contains the authoring tools, and one which is runtime only.

THE DATABASE ADD-ON

SQL database support is provided via DBi. The DBi tools must be linked into the development environment, so have your C compiler handy. DBi provides two new functions: SQL and DBMS. The SQL function lets you send standard SQL instructions to the server. The DBMS function provides an API (application programming interface) that lets you take advantage of nonstandard features of back-end engines (backward scrolling and stored procedures, for example), and

FACT FILE

JAM/DBi for DOS, Version 5.0

JYACC Inc., 116 John St., New York, NY

10038; 800-458-3313, 212-267-7722;

fax, 212-608-6753

List Price: \$595 for each JAM development license,

plus \$395 for DBi (database interface)

Requires: 512K RAM (640K recommended), 2MB hard disk space, C compiler

In Short: A DOS-based development tool, JAM/DBi is unusual in the number of platforms and data-

base formats it supports. While its many features and capabilities take some time to learn, serious developers who need cross-platform and cross-format support will find the time well spent



it can transparently simulate the capability if it's not available.

There is some cooperation between JAM and DBi. When a SQL statement is executed, for example, if you have named the fields on the form, they are populated with the data from the corresponding columns in the result set. Also, when constructing SQL code for INSERT, UPDATE, and JOIN commands, JPL provides a macro-substitution capability that lets you build a SQL statement with "blanks" that are filled in with the current field contents at runtime. But beyond this, it's up to the programmer to construct the SQL statements to execute from within the application.

DBi comes with a utility to generate a default form from a table definition on the server. This generates your SQL statements for you, and incorporates validation rules and data-type masking inherited from the data type on the server. DBi also comes with an unusual utility that can generate a SQL table from a form definition, but in most instances you will define your tables before your forms.

JAM is a complex and powerful development tool that takes some time to learn; if you need to develop for just one platform, you would probably be better off with something less daunting. But if cross-platform, cross-database support is a high priority, the time you spend learning to use JAM will be time well spent.

SQL Front Ends

Matesys Corp.

ObjectView

BY JONATHAN ZUCK

ObjectView, Version 1.10, an early player in the SQL database front-end market, is a Windows and OS/2 development tool known for its ease of use and speed, and for the flexibility the developer is given in building the user interface. ObjectView was introduced over a year ago; though sorely due for an update (Version 2.0 should be released this September), it is still the tool of choice for applications that require nonstandard interfaces or unusual functionality. Its multilanguage support, while costing the product a certain degree of integration, provides flexibility.



BUILDING THE USER INTERFACE

ObjectView centers around a powerful screen painter with tools for building complex user interfaces. You can select from a list of interface objects (also called "controls") using either a toolbar or a menu. The list includes standard Windows controls and some enhanced ones. Some Windows controls are not fully supported; for example, ObjectView provides list boxes but lacks the ability to create multiselect lists. The enhanced controls, however, are impressive: geometric objects that can be used as buttons; a picture control that supports transparencies, .BMP, .PCX, and meta files; and edit fields with masks, validations, help, and calculations.

The most impressive enhanced control in ObjectView is the Table Object. This spreadsheet-like grid is fast, flexible, and loaded with features: column and row formatting, picture cell support, and file operations, to name a few. The generated display is entirely dynamic, expanding and contracting to accommodate the result sets displayed. But it is limited in that cell calculations are only available through database functions.

Once the screen is built, the developer selects actions to associate with each control. There is a set of over 60 built-in high-level controls, including file access, database access, and DDE requesting. These macro commands are mainly useful for fast and painless prototyping; since they are quite limited, few will end up in your completed application.

For more complex control actions—when you need to associate multiple commands with an event, trap multiple events, or use conditional logic—you must resort to linguistic event handlers. ObjectView comes with a built-in BASIC p-code compiler. (Noticeably absent from ObjectView BASIC is a debugger, which will be included in Version 2.) You can also purchase a C version of the package (\$999), which supports Borland C and Microsoft C compilers.

Because of ObjectView's multilanguage support, the screen painter and the BASIC compiler are not as tightly integrated as they could be. Developers must create the event handlers for a specific screen in an ASCII text file with the same name as the screen. This makes code management easier and allows one event handler to be associated with more than one control, but also means that the code is not stored with interface objects.

ObjectView BASIC goes beyond the standard features to provide functions for SQL database access, screen manipulation, DDE, and file com-

pression. There is also support for dBASE file and index access as well as Btrieve access. While such support is a nice feature, the growing number of commercially available libraries providing access to these formats makes it less of an advantage than it once was.

ObjectView ships with many sample applications, which is good, since the documentation is often unclear. The sample applications would be even more useful if they were cross-referenced within the documentation to provide illustrations of the concepts discussed. In the previous release, on-line help was added to the screen painter, which helped mitigate the shortcomings of the documentation.

ObjectView features a powerful screen painter with tools for building complex user interfaces.



After building a screen, ObjectView developers can associate "actions" with each control through macros.

As a demonstration of ObjectView's power, one of the sample applications, Visual Query, doubles as a utility. Visual Query provides capabilities for ad hoc querying and report writing as well as database creation and maintenance.

Two additional utilities ship with ObjectView (neither are sample applications). The first is MiniAlbum, a tool to store, retrieve, and manage images for use with the screen painter. The second, ObjectManager, lets you store and retrieve screen objects created in the screen painter along with their associated high-level commands. Because of the segmented nature of the development environment, you cannot store the code associated with these controls.

WHAT'S COMING UP?

ObjectView, Version 2.0, should be shipping by the time this article is in print.

FACT FILE

ObjectView, Version 1.10

Matesys Corp., 900 Larkspur Landing Circle, 1st Floor, Larkspur, CA 94939; 800-777-0545, 415-925-2900; fax, 415-925-2909

List Price: \$899

Requires: 386SX-based PC or better, 2MB RAM (4MB recommended), Microsoft Windows 3.x

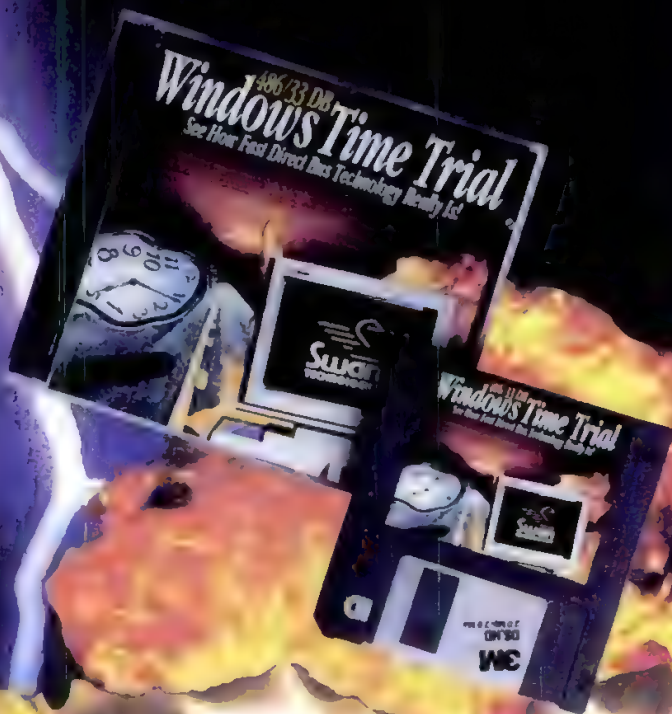
In Short: ObjectView entered the SQL front-end development market early in the game. It provides an unusually broad array of user interface options and special features, but is sorely due for an update (expected to be released this fall)

provides an unusually broad array of user interface options and special features, but is sorely due for an update (expected to be released this fall)

ON READER SERVICE CARD

**THE NEW
"DIRECT BUS"
TECHNOLOGY...**

HOW FAST IS IT?



**FIND OUT
EXACTLY HOW
FAST...**

Get Your
Copy Of The
Windows Time Trial
FREE!

Get The Windows Time Trial FREE... And Find Out!

This exciting demonstration software will show you exactly how much faster the new direct bus machines really are. You'll see head-to-head comparisons with other popular PC's, new and old - in fact, you'll probably see the machine you're now working with. But most importantly you'll find out how much time and money you could be saving right now by using the new direct bus technology.

Call or send today for your Free Copy!

To run the Windows Time Trial you must have Windows™ 3.0 or newer.

Name _____
Address _____
City _____ State _____ Zip _____
Daytime Phone (____) _____ Fax (____) _____
(required for Free Windows Time Trial Kit)
Is this your home or business address? ☐ Home ☐ Business (if bus please be sure co name & address are correct)

1. Which of the following best describes how you use your computer? (Check one)

Family and Professionally Commercial
household use working at home or business

2. Number of PCs installed at this site. _____

3. Type of computer platforms used.

XT _____ 386 _____ Mac _____
AT _____ 486 _____ Other _____

4. Number of office workers _____

5. Types of equipment acquisition planned in the next 12 months. _____

Are you planning to make a buying decision in the next 90 days? _____

**Send or Call,
1-800-446-2498**

Mail To:
3075 Research Drive • State College, PA 16801

Fax 1-814-237-5416

The New Direct Bus Technology

FIND OUT HOW FAST

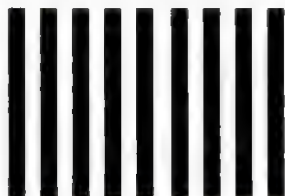
IT REALLY IS ... FREE!

Just complete and return the postage-paid card below to receive your Free copy of the Windows Time Trial from Swan.

You'll see first-hand, exactly how much time and money the new Direct Bus Technology can save you! And with this new design costing about the same as the older technology, you'll want to order this exciting demonstration right away!



NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES



BUSINESS REPLY MAIL

FIRST CLASS MAIL PERMIT NO. 140 STATE COLLEGE PA

POSTAGE WILL BE PAID BY ADDRESSEE

SWAN TECHNOLOGIES

PO BOX 1006

STATE COLLEGE PA 16804-9959



**Find out why PC manufacturers
are scrambling to get their hands
on Direct Bus design!**

Get your Free copy of the Windows Time Trial. Complete and return the response card at left. Or, if it's more convenient, just give us a call at 1-800-446-2498. We'll send your Free copy right away!

**Send or Call,
1-800-446-2498**

Or, you may Fax the response form to
1-814-237-5416



3075 Research Drive • State College, PA 16804

■ Other Roads to SQL Access

by Jonathan Zuck

You don't need a dedicated front end like the ones we review on these pages to access SQL databases. The alternatives fall into two categories: libraries callable from standard programming languages, and SQL hooks for use with standalone applications.

LOW-LEVEL POWER

The high-level development environments we present here can be time-savers. But if you need raw power, your best bet is a SQL access library that is callable from a standard programming language. The chief strength of dedicated SQL development environments is their high-level support for database operations; this can also be their most serious drawback. For example, if part of your application involved nondatabase activity such as communications support, a high-level tool might not provide the functionality you need. A 3GL (third-generation language) such as BASIC, C, or Pascal is sometimes necessary to accomplish the task.

All of the SQL engine vendors provide access libraries for use by 3GL programmers, although support may not be available for both DOS and Windows. These libraries usually include functions that enable you to connect to a database over a network and functions for accessing data.

Most SQL access libraries are written to be callable from the C programming language. Developers working in other languages or in a high-level development environment (like Asymetrix's ToolBook) can use wrapper li-

braries, which are provided either by back-end vendors or by a third party. *Wrapper libraries* provide translation of unsupported data types and supply high-level alternatives to functions that cannot be used directly. Examples are functions with callbacks (which are not supported in some languages) and libraries using the C calling convention.

BASIC programmers can use BSQL with BASIC 7 and VBSQL with Visual Basic. Both of these are wrapper libraries for dbLib—the API for SQL Server. SQL Express, from Aardeus Inc., has wrapper libraries for both Visual Basic and ToolBook. The wrapper library provides a thin translation layer between the application programmer and the native C API of the engine; often the function names are even similar.

CROSS-ENGINE ACCESS

Some access libraries are provided by the back-end vendors themselves; these are dedicated to the particular engine each vendor produces. While such libraries are not portable, they do guarantee access to all the features the SQL engine supports. Some third-party vendors have libraries that standardize on a particular vendor's API, though those libraries may access more than one back end. Others have developed a proprietary API for accessing several back ends (see the sidebar "Standalone SQL Engines").

The danger of such a cross-engine tool is that it may take a "least-common-denominator" approach—and may not support nonstandard features

unique to a particular back end. To take full advantage of an engine's strengths, you must access the engine with its native functions. This lets you more fully optimize your code, select indexes manually, and use special features such as stored procedures.

SQL HOOKS

In addition to dedicated SQL access libraries, there are many products designed to connect local databases to SQL databases. SQL add-ons are available from the vendors of many database systems, including dBASE, Paradox, DataEase, Advanced Revelation, Omnis 7, and Superbase 4. These products provide a means for translating record-oriented operations into SQL operations so that a 4GL (fourth-generation language) application can be ported to a client/server configuration with ease. They also provide pass-through functionality for access to engine features without parallels in 4GL.

For some products, there is also a healthy third-party add-on market. Clipper and FoxPro programmers can use ClipSQL from Aladdin Publishing or RaSQL from Pinnacle Publishing. These products attempt some translation of record-oriented functions, but they are not nearly as transparent as access tools provided by the vendors; they are primarily used for in-line SQL, similar to 3GL SQL access.

The many libraries and add-ons let you connect to SQL databases from almost any application. A surprising number of products provide a way of hooking into SQL. □

Matesys plans to enhance the product's database awareness, improving its abilities to create joins and complex updates while minimizing code size. Version 2.0 will also contain a data dictionary feature that will allow developers to store screen and code definitions on the SQL database server, which will allow for better group resource sharing and reusability. The BASIC language will include an inte-

grated debugger, and there will be much greater report-generation support. Finally, still more user-interface features will be added, including support for custom controls written in C and a true spreadsheet control that includes calculation.

In its current incarnation, ObjectView is a powerful, fast, and flexible SQL development tool that allows you to accom-

plish a great deal even though it requires very little training. It is especially well suited for writing applications that call for nonstandard interfaces or functionality beyond data manipulation. Though ObjectView presently lacks the database awareness and group development features that can be found in competing products, these weaknesses will be corrected in Version 2.0.

She's 5 years old.
She's already had
7 names,
16 identities and
21 homes.



Ad
Council

Every year thousands of children are kidnapped by their own parents. Beginning the tragic ordeal of life on the run. Child Find offers an end to the running. With our toll-free number and our mediation program, we offer a way out for the parents and for the kids.

For us, it's a labor of love. But unfortunately, we can't operate on love alone.

To find out how you can help, or if you need our help, please call 1-800-A-WAY-OUT. And help another child find a more peaceful future.



CHILD FIND OF AMERICA INC.

PowerSoft Corp.

PowerBuilder

BY JONATHAN ZUCK

PowerBuilder is a high-end, SQL-based, client/server development tool for Windows. Version 1.0b established PowerBuilder as a popular product. With Version 2.0, which adds and refines features such as dynamic SQL, report writing, MDI (multiple document interface) support, custom object creation, and object-oriented programming (OOP) support, PowerBuilder moves to the head of its class.



A MODULAR APPROACH

The PowerBuilder development environment is divided into screens called "painters," each of which is responsible for the creation and maintenance of a particular aspect of the application. These screens include the Application Painter, the Database Painter, and the Window Painter. Each of these components is stored in a private (client-based) or public (server-based) library. For group projects, PowerBuilder provides services such as library management and check-in/check-out of resources.

PowerBuilder's modular structure might frustrate programmers accustomed to more traditional, integrated environments. For example, the need to enter one painter to create functions and another to create forms may seem excessive. While PowerBuilder's approach is meant to provide a menu-driven replacement for the INCLUDE and .LIB files found in traditional programming, the newness of this approach makes the learning curve for PowerBuilder longer than it would be otherwise.

Most of your development time will be spent designing screens in the Window Painter. You can place any standard Win-

dows control on the form, or one or more of PowerBuilder's proprietary DataWindow controls, and then associate code (in the form of event handlers) with each control. PowerBuilder directly supports nearly all the standard Windows events, including aggregate events such as drag-and-drop. Others can be accessed indirectly (although with a performance hit) using the generic message handler.

The development language, PowerScript, is billed as a superset of BASIC. While it is similar to standard BASIC, there are a number of differences that make it less than a smooth transition. Some of these differences are unavoidable, but others seem almost arbitrary. It is unfortunate that PowerScript does not adhere more closely to the existing BASIC language standards, but PowerScript does offer over 500 additional functions, including embedded SQL. It also includes a powerful debugger that provides breakpoints and watch variables

that can be saved between sessions.

When you have completed your application, PowerBuilder generates a p-code executable for distribution that can be loaded on the server or client machines along with the PowerBuilder libraries. The product supports the dynamic PowerBuilder libraries, similar to Windows DLLs, for execution-time access.



PowerBuilder's Window Painter provides support for both proprietary user interface controls and standard Windows controls.

HIGH DATABASE AWARENESS

Designed from the ground up as a dedicated SQL front end, PowerBuilder is "database aware," with many SQL-specific features not found elsewhere. One example is the DataWindow, which offers tabular, grid, and free-form views of data and is capable of most data access functions with little or no programming or knowledge of SQL.

One shortcoming of Version 1.0b was the excessive data-type protection in DataWindow. If the DataWindow had been developed for a database that had one data type for date and time, it would not work when transferred to a database

Take your high-end PC to a whole new altitude.



Who would have thought 3.5" could soar to such heights? Seagate's ST1480 family is the perfect way to make sure your high-end PC or workstation can climb to the top of its capacity and performance category.

Start with 331 to 525 formatted megabytes of capacity. Then add the performance of a Fast SCSI-2 or embedded AT interface. And take it to turbo speeds with data rates of up to 10 MB per second, backed by a 4,412

Seagate's ST1480 family: Superior performance in high-capacity 3.5" disc drives.

RPM spindle, an average latency of 6.8 milliseconds and an average seek time of 14 milliseconds.

While you're at it, figure in a 150,000-hour MTBF that'll make sure your system stays up and running for a long, long time.

Ready to aim your sights higher? Good—because we're ready to fill your tallest order today. Call Seagate at 408-438-6550 to learn more about how high the ST1480 family can take you.

 **Seagate**

The first name in disc drives

Seagate and the Seagate logo are registered trademarks of Seagate Technology, Inc. © 1992 Seagate Technology, Inc.

A Selection of Dedicated SQL Front Ends

Product	Version	List price	Platforms	Supports SQL engines from
 Analysis Tools				
Intelligent Planner	1.2	Varies	DOS, OS/2, Unix, Windows	Gupta, Novell, Oracle
PageAhead InfoPublisher	1.2	\$295	Windows	Microsoft, Oracle
SPSS Statistical Data Analysis	4.0	Varies	OS/2, Unix, Windows	Informix, Ingres, Microsoft, Oracle, Sybase
SQLSheet	1.02	\$495	DOS	Microsoft, Novell, Oracle, Sybase
 Development Tools				
Advanced Revelation	1.5	\$1,995	DOS, OS/2	IBM, Microsoft, Novell, Oracle
AM (Application Manager)	4.0	\$7,400	OS/2	IBM, Microsoft, Oracle
Building Blocks	2.1	\$795	Windows	Gupta, IBM, Microsoft, Oracle
Choreographer	2.3	\$7,500	OS/2, Windows	IBM, Microsoft, Novell
Clarion Database Developer	3.0	\$995	DOS	Gupta, IBM, Ingres, Microsoft, Novell, Oracle, XDB
CS/ADS	6.2	Varies	DOS, Unix, Windows	Informix, Novell, Oracle,
EASEL Workbench	1.0	\$11,900	OS/2, Windows	IBM, Ingres, Microsoft, Oracle
Enfin/2	1.53	Varies	OS/2, Windows	Gupta, IBM, Microsoft, Oracle
Enfin/3	1.00	Varies	OS/2	Gupta, IBM, Microsoft, Oracle
ERwin/ERX	1.1	\$1,995	Windows	Gupta, IBM, Informix, Ingres, Microsoft, Novell, Oracle, XDB
4D SQL Server	1.1	\$300/user	OS/2, Unix	IBM, Microsoft, Novell, Sybase
4th Dimension DAL	1.1	\$395/user	Unix	IBM, Informix, Ingres, Oracle, Sybase
Jterm	2.2	\$175/user	DOS	Microsoft
Kappa-PC	2.0	\$3,500	Windows	Oracle
LaserView Windows	2.0	\$1,495	Windows	Gupta, Microsoft, Novell, Oracle
Magic	5.0	Varies	DOS, OS/2, Unix, Windows	Informix, Ingres, Microsoft, Novell, Oracle, RDB, Sybase
NOMAD	3.2	\$2,895 + \$695/user	DOS, OS/2	Gupta, Microsoft
Object/1	2.1	\$995	OS/2, Windows	IBM, Microsoft, Oracle
OpenInsight	1.01	\$895	Windows	Microsoft, Oracle
PageAhead InfoPublisher DK	1.2	\$495	Windows	Microsoft, Oracle
Q+E DB Library	1.1	\$399	OS/2, Windows	Gupta, IBM, Ingres, Microsoft, Novell, Oracle, XDB
Sequelink	2.1	Varies	OS/2, Unix, Windows	IBM, Ingres, Microsoft, Novell, Oracle
Smalltalk/SQL	1.1	Varies	DOS, OS/2, Unix, Windows	Gupta, IBM, Microsoft, Novell, Oracle, Sybase
SQLFile	2.3	\$495	DOS, OS/2, Windows	Microsoft, Novell, Oracle, Sybase
WinOcular-Application Builder	1.02	Varies	DOS	Gupta, Novell
 Query Tools				
Accesspoint	1.0	\$595/user	Windows	Gupta, Microsoft, Sybase
CS/ADS ReportWriter	6.2	Varies	DOS, Unix, Windows	Informix, Novell, Oracle
DataPrism	1.7	\$399	Windows	IBM, Ingres, Microsoft, Oracle
Dynamic Query	2.0	\$495	DOS	Microsoft, Oracle
Easy SQR	—	Varies	DOS, Unix	IBM, Informix, Ingres, Oracle, Sybase
GQL	3.0	Varies	Windows	Ingres, Microsoft, Novell, Oracle
Intelligent Query	2.69	Varies	DOS, OS/2, Unix	Informix, Ingres, Novell, Oracle, Progress, Sybase, Unify
Natural Language	5.1	\$5,000	Unix	Informix, Ingres, Oracle, Sybase
Q+E DB Editor	2.7	\$299	OS/2, Windows	Gupta, IBM, Ingres, Microsoft, Novell, Oracle, XDB
R&R Report Writer	3.0	\$299	DOS	Oracle, Novell, XDB
SeaView	1.2	Varies	OS/2, Windows	Gupta, Microsoft, Novell
SmartLeaf	2.0.7	Varies	Unix	IBM, Ingres, Oracle
SmartLeaf/Compare	2.1.4	Varies	Unix	IBM, Ingres, Oracle
SmartLeaf/Librarian	2.0.7	Varies	Unix	IBM, Ingres, Oracle
Snow Report Writer	4.0	\$695	DOS, OS/2, Unix, Windows	Gupta, IBM, Ingres, Microsoft, Novell, Oracle, XDB
SQLassist	3.1	Varies	Unix	Informix, Ingres, Oracle, Sybase
SQL Commander	2.3a	Varies	OS/2, Unix, Windows	Microsoft, Novell, Sybase
SQR	—	Varies	DOS, Unix	IBM, Informix, Ingres, Oracle, Sybase
TeleMagic	12.3	\$695	DOS, Unix	IBM, Novell
WinList	3.1	\$349	Windows	Gupta, IBM, Microsoft, Novell, Oracle

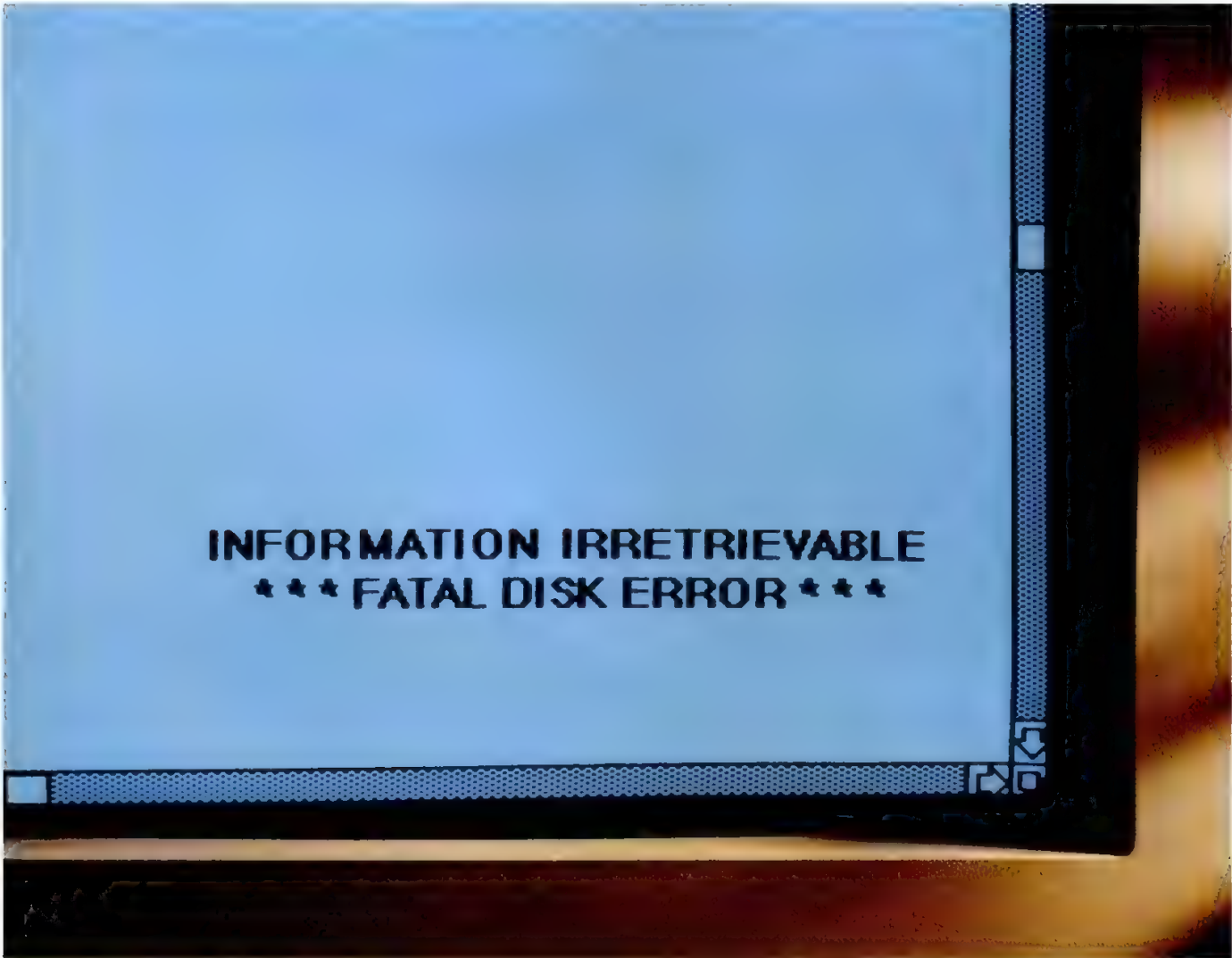
SQL Front Ends

Company	Address	Toll-free number	Toll number	Fax
PlanView Inc	7320 N. Mopac Expy., #312 Austin, TX 78731	—	512-346-8600	512-346-9180
PageAhead Software Corp	2125 Western Ave., #301 Seattle, WA 98121	800-967-9671	206-441-0340	206-441-9876
SPSS Inc	444 N. Michigan Ave., Chicago, IL 60611	800-543-9262	312-329-2400	312-329-3690
Vinzant Inc	4 Skyline Dr., Portage, IN 46368	—	219-763-3881	219-763-1072

Revelation Technologies Inc	181 Harbor Dr., Stamford, CT 06902	800-262-4747	203-973-1000	203-975-8744
Intelligent Environments Inc	2 Highwood Dr., Tewksbury, MA 01876	800-669-2797	508-640-1080	508-640-1090
FrontEnd Systems Inc.	P.O. Box 776, Fairfax, CA 94930	—	415-459-6187	415-459-0247
GULdance Technologies Inc.	800 Vinial St., Pittsburgh, PA 15212	—	412-231-1300	412-231-2076
Clarion Software Inc	150 E. Sample Rd., Pompano Beach, FL 33064	800-354-5444	305-785-4555	305-946-1650
Convergent Solutions Inc	100 Meritt Park South, Laurence Harbor, NJ 08878	800-275-0789	908-290-0090	908-290-1494
Ease Corp	25 Corporate Dr., Burlington, MA 01803	—	617-221-2100	617-221-6899
Enfin Software Corp	6920 Miramar Rd., #307, San Diego, CA 92121	—	619-549-6606	619-549-6798
Enfin Software Corp	6920 Miramar Rd., #307, San Diego, CA 92121	—	619-549-6606	619-549-6798
Logic Works Inc	214 Carnegie Center, Princeton, NJ 08540	—	609-683-0054	609-243-9192
Acius Inc.	10351 Bubb Rd., Cupertino, CA 95014	—	408-252-4444	408-252-7765
Acius Inc.	10351 Bubb Rd., Cupertino, CA 95014	—	408-252-4444	408-252-7765
JYACC Inc	116 John St., New York, NY 10038	800-458-3313	212-267-7722	212-608-6753
InterCorp Inc	1975 El Camino Real West, Mountain View, CA 94040 2216	—	415-965-5648	415-965-5647
LaserData Inc	300 Vesper Park, Tynsboro, MA 01879	—	508-649-4600	508-649-4436
Magic Software Enterprises Inc	1200 Main St., Irvine, CA 92714	800-345-6244	714-250-1718	714-250-7404
MUST Software International	101 Merritt 7, Norwalk, CT 06856	800-441-6878	203-845-5000	203-845-5252
mdbs Inc.	P.O. Box 6089, Lafayette, IN 47903	800-445-6327	317-447-1122	317-448-6428
Revelation Technologies Inc	181 Harbor Dr., Stamford, CT 06902	800-262-4747	203-973-1000	203-975-8744
PageAhead Software Corp	2125 Western Ave., #301, Seattle, WA 98121	800-967-9671	206-441-0340	206-441-9876
Pioneer Software Inc	5540 Centerville Dr., #324, Raleigh, NC 27606	800-876-3101	919-859-2220	919-859-9334
TechGnosis Inc	301 Yamato Road, #2200, Boca Raton, FL 33431	800-321-0543	407-997-6687	407-241-6143
Synergistic Solutions Inc	63 Joyner Dr., Lawrenceville, NJ 06648	—	609-586-0025	609-587-1468
Vinzant Inc.	4 Skyline Dr., Portage, IN 46368	—	219-763-3881	219-763-1072
Combined Computer Resources	5429 LBJ Freeway, #900, Dallas, TX 75240	800-955-4703	214-851-7773	214-851-7743

Viewpoint Systems Inc.	1900 S. Norfolk St., #310, San Mateo, CA 94403	—	415-578-1591	415-578-8130
Convergent Solutions Inc	100 Meritt Park South, Laurence Harbor, NJ 08878	800-275-0789	908-290-0090	908-290-1494
Brio Technology Inc	444 Castro St., #700, Mountain View, CA 94041	800-486-2746	415-967-4110	415-961-4572
ProLab Software Inc	120 E. 86th St., New York, NY 10018	—	212-831-0700	212-831-4817
Sybase Inc.	6475 Christie Ave., Emeryville, CA 74608	800-685-8225	510-596-3500	510-658-1384
Andyne Computing Ltd	552 Princess St., 2nd Fl., Kingston Ont., Canada K7L 1C7	800-267-0665	613-548-4355	613-548-7801
IQ Software Corp	3295 River Exchange Dr., #550, Norcross, GA 30092	800-458-0386	404-446-8880	404-448-4088
Natural Language Inc	2910 Seventh St., Berkeley, CA 94710	—	510-841-3500	510-841-3628
Pioneer Software Inc	5540 Centerville Dr., #324, Raleigh, NC 27606	800-876-3101	919-859-2220	919-859-9334
Concentric Data Systems Inc	110 Turnpike Rd., Westboro, MA 01581	800-325-9035	508-366-1122	508-366-2954
Science & Engineering Associates Inc	6100 Uptown Blvd. NE, Albuquerque, NM 87110	800-732-1452	505-884-2300	505-884-2991
Database Publishing Software Inc	800 W. Cummings Park, #8800, Woburn, MA 01801	—	617-938-0018	617-938-3810
Database Publishing Software Inc	800 W. Cummings Park, #8800, Woburn, MA 01801	—	617-938-0018	617-938-3810
Database Publishing Software Inc	800 W. Cummings Park, #8800, Woburn, MA 01801	—	617-938-0018	617-938-3810
Snow Software	2300 Congress Ave., Clearwater, FL 34623	—	813-784-8899	813-787-1904
Software Interfaces Inc	1400 Broadfield, #660, Houston, TX 77084	—	713-492-0707	713-492-0725
Datura Corp	1926 E. Parham Rd., Richmond, VA 23228	—	804-264-1225	804-264-1297
Sybase Inc	6475 Christie Ave., Emeryville, CA 74608	800-685-8225	510-596-3500	510-658-1384
Remote Control International	5928 Pascal Court, #150, Carlsbad, CA 92008	800-942-9952	619-431-4000	619-431-4006
OSoft Development Corp	2964 Peachtree Rd., #350, Atlanta, GA 30305	—	404-393-2384	404-237-0706

LOSING YOUR MEMORY IS A MOMENT YOU'LL NEVER FORGET.



INFORMATION IRRETRIEVABLE
*** FATAL DISK ERROR ***



Remember the last time
you used a bad com-
puter disk?

Sure you do. You

promised yourself that it was
the last time you'd ever use a
bad computer disk.

And it will be. If you remem-

ber to start using BASF disks.
Made by the people who in-
vented magnetic recording.

BE SAFE. BASF.



BASF

SQL Front Ends

that used separate data types to record these variables. This meant that DataWindows could not be created dynamically, nor could they make use of dynamic SQL from within the PowerScript language. Both of these limitations have been eliminated in Version 2.0, making PowerBuilder more flexible than before.

PowerBuilder maintains a local dictionary of information associated with each table in the database. Using the Database Painter, you can define database-specific attributes such as default labels, default values, and validations at the table level rather than the form level. These attributes, which can be overridden if necessary, are a convenience.

OOP WITHOUT THE OUCH!

One of the most exciting new features of PowerBuilder 2.0 is its object-oriented extensions. Since components of each application are stored in the libraries at a fairly granular level, it was only natural that PowerBuilder would eventually offer encapsulation and inheritance options. PowerBuilder's OOP capabilities are not linguistic in nature, but rather are driven by the interface. That means a shallower learning curve for users.

In OOP, *inheritance* is the ability to create one object and then create others which are based on the first. With PowerBuilder, a developer can either start from scratch in the Window Painter or inherit the attributes of a prebuilt window. When a window inherits the attributes of another, all of the visual objects and associated code become part of the new window. The programmer can then add to or overwrite any of these components. This functionality can be used for something as simple as maintaining a consistent visual interface, or as complex as managing group development efforts.

Another new OOP feature is the ability to build and incorporate custom controls. PowerBuilder allows for three types of custom controls: standard, aggregate, and external. The *standard control* is a Windows control associated with a custom set of actions and stored for reuse. For example, a list box might be used to build a custom file-list control with attributes for the path and events for path change and file selection. The *aggregate control* is a combination of standard controls that are stored and reused as a

There's only one way to get around out here.



OS2 VERSION
NOW AVAILABLE!

The most
comprehensive
TCP/IP
implementation
in the industry.

NETWORKS

No matter who or what your PC needs to communicate with, there's nothing like PC/TCP Plus. It's not only the fastest, but also the most comprehensive TCP/IP implementation in the industry. And PC/TCP Plus has NFS™ access built right in.

Providing connectivity to other PCs, minicomputers and mainframes, PC/TCP Plus communicates over Ethernet, Token Ring and StarLAN networks with operating systems ranging from UNIX and VMS to VM and MVS. And you can forget hardware incompatibility; PC/TCP Plus

supports the largest selection of LAN interfaces in the business.*

From around the world to around your office, now your PC can transfer files, send and receive electronic mail, emulate VT100, VT220 and IBM 3278 terminals, access NFS servers, and much, much more. VINES™ and NetWare™ users will appreciate PC/TCP's full compatibility, as will customers of Oracle's distributed PC database products. And with our Development Kit, including a Berkeley Sockets library, you have all you need to produce custom applications.

So, the next time you want to get from here to there, get PC/TCP Plus, the TCP/IP implementation that gives you a whole new perspective on network communication. Call us at (617) 246-0900 for more information.

PC/TCP is a registered trademark of FTP Software, Inc.
VINES is a trademark of Banyan Systems, Inc.
NetWare is a trademark of Novell, Inc.
NFS is a trademark of Sun Microsystems, Inc.

FTP Software, Inc.
26 Princess St.
Wakefield, MA 01880-3004
Phone: (617) 246-0900
Fax: (617) 246-0901



*PC/TCP Plus supports interfaces from Acer, Allied Telesis, Apricot, AT&T BBU, DEC, D Link, DSC, Epsilon, Gateway Communications, IBM TBM, Networks, Intel, Interlan, Longshine, MC Associates, National Semiconductor, Novell, Primox, Schneider & Koch, Scope, IDNet, Xcom, Tarn, Tarnet, TRW, Ungermann-Bass, Univision, Western Digital and YCL, in addition to the ANSI, NDIS and Packet Driver specifications.

CIRCLE 031 ON READER SERVICE CARD

PROTECT YOUR COPIES OF PC MAGAZINE

Make your collection of PC Magazine a handsome addition to your office or home—and protect and organize your copies for easy reference!

PC Magazine Binders and Cases are made of durable, luxury-look leatherette over quality binder board. Custom designed for PC Magazine, every order receives FREE transfer foil to mark dates and volume numbers.

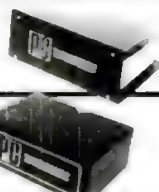
FOR FAST SERVICE CALL TOLL-FREE 1-800-825-6690

MAGAZINE BINDERS

Hold your issues on individual snap-on rods. \$9.95 each; 3 for \$27.95; 6 for \$52.95.

OPEN BACK CASES

Store your copies for individual reference. \$7.95 each; 3 for \$21.95; 6 for \$39.95.



PC MAGAZINE

Please send ☐ Binders ☐ Cases Quantity _____
Payment enclosed \$_____. * Add \$1 per case/binder for postage & handling. (Outside USA, add \$2.50 per case/binder ordered, US currency only.)

Charge my:
☐ Amex ☐ Visa ☐ MC (Minimum order \$15)

Card No. _____ Exp. Date _____

Mr./Mrs./Ms. _____
Please Print Full Name

Address _____
No P.O. Numbers Please

City _____

State _____ Zip _____

*PA residents add 6% sales tax.

Get a hold of the best value in LAN power protection

Now just \$139! suggested list price

Blackouts, brownouts, sags... Your data and hardware are vulnerable to problems that surge suppressors and power directors are just not equipped to handle.

Now there's a complete Uninterruptible Power Supply solution to suit any budget. The Back-UPS™ 250 is reliable protection for LAN nodes, 386SX machines, 286, small PS/2 systems, and internetworking hardware such as routers, bridges, gateways and repeaters.

From the largest server to the smallest router, the Back-UPS Series will increase your productivity by providing a cost-effective solution to power problems. Call for your free power protection handbook.



The Back-UPS 250 offers even more cost-effective protection for LAN nodes (typical runtime for a 386SX system is 10 minutes).



■ **ABSOLUTE™** Protection guarantees repair or replacement of equipment (up to \$25,000) if damaged by a surge while protected by a properly installed Back-UPS. (See warranty for details.)

■ UL, CSA and Novell approved with a 2 year warranty

■ Full-time surge protection and line filtering

■ Most models include LAN interface for automatic shutdown of Novell, LAN Manager, LAN Server, LANtastic, Banyan, SCO Unix, and others

■ Ask about PowerChute™ UPS monitoring software and Novell compatible UPS monitoring boards

■ 230V models available



The Back-UPS™
by American Power Conversion
(800)800-4APC, Dept. E4

APC 132 Peigmonds Road, West Kingston, RI 04017-0837
APC Europe TEL: (+33)1 64 62 59 00 FAX: (+33)1 64 62 78 59

©1991, Back-UPS, PowerChute, Guaranteed ABSOLUTE Protection are trademarks of APC. All other trademarks are property of their respective owners.

Model	Application	List	New List
Back-UPS 250	LAN nodes, 386SX, 286, internet hardware, POS	\$149	\$139
Back-UPS 400	Desktop 386, 486 systems, 286 servers	\$249	\$229
Back-UPS 450	Tower 386, 486 systems, servers	\$279	\$279
Back-UPS 600	Heavy configured systems, CAD/CAM workstations	\$399	\$399
Back-UPS 950	Multiple systems, longer runtime applications	\$599	\$599
Back-UPS 1250	Multiple systems, LAN hubs, email mess, telecom equipment	\$799	\$799

NEW
NEW

CIRCLE 162 ON READER SERVICE CARD

unit. Examples of this type of control would be a palette of buttons that perform standard data access operations, or a palette from which to select a color. Aggregate controls may themselves be pyramided into other aggregate controls, or aggregate and standard controls may be mixed. An *external control* is a custom control written in a standard language and stored in a DLL. Developers can define the attributes and events of these custom controls so they behave like native, transparent PowerBuilder controls.

A GOOD REPORT

One limitation of Version 1.0b was its weak report-writing functionality. It lacked the ability to print subreports—with separate headers, footers, and totals—in one run. This has been remedied through enhancements to the DataWindow object. You can now define, by group, the headers, footers, and totals to be displayed and the data window to be printed. The printing commands are now more sophisticated, too, though PowerBuilder could certainly go further in this regard by providing a separate painter for building complex reports with less effort.

PowerBuilder is a powerful tool for SQL front-end development that deserves serious consideration by developers of Windows client/server apps. With its visual development environment, sophisticated controls, rich BASIC dialect, multilanguage support, and OOP features, PowerBuilder represents the state of the art in front-end tools. □

FACT FILE

PowerBuilder, Version 2.0

PowerSoft Corp., 70 Blanchard Rd.,
Burlington, MA 01803; 800-395-3525,
617-229-2200; fax, 617-273-2540

List Price: \$3,495

Requires: 386-based PC or better,
2MB RAM (4MB recommended),
8.5MB hard disk space, Microsoft
Windows 3.x.

In Short: PowerBuilder, a high-end
visual development package, fea-
tures object-oriented extensions
and dynamic SQL. The modular structure may challenge
more traditional programmers.



ON READER SERVICE CARD

MOVING?

Please write to: PC Magazine, P.O. Box 54093, Boulder, CO 80322. Include your mailing label from a recent issue of PC Magazine for faster service. Please allow up to 60 days for change of address to take place.

NEW!

Northgate SlimLine™ Is Back And Faster Than Ever!

DX2/66
Available
Now!

Northgate Local Bus High Speed Windows And GUI Video – An Industry First!



Northgate ZXP System With Unlimited Upgradability - Compatible With Intel® SX/25, DX33, DX2/50, DX2/66 And All OverDrives!

A Northgate Exclusive! No other computer offers this price/performance!

- Intel 80486SX™/25 MHz processor
- 4MB of RAM; expands to 32MB on board
- Virtual Cache – Zero Wait State Performance
- 100MB hard drive
- 1.2MB or 1.44MB floppy drive
- High-speed local bus VGA with 1MB video RAM
- 1024 x 768 monitor
- MS-DOS® 5.0, Microsoft® Windows™ 3.1 and mouse
- Award-winning Northgate service and support!
- 30-day no-risk money back guarantee
- Winmarks (V2.5) of 7.9 million
- PowerMeter™ MIPS (V1.7) of 14.8



Call for more information!
800-828-6125



Major corporations, volume purchasers and government
agencies call National Business Accounts: 800-545-4065

GSA# GS00K91AGS5193 PS01

Major credit cards, money orders, direct wire and approved
company purchase orders accepted.



**NORTHGATE
COMPUTER
SYSTEMS, INC.**

1075 Flying Cloud Drive, Eden Prairie, MN 55344

"When it has to work right!"

© Copyright Northgate Computer Systems, Inc. 1992 All rights reserved. Northgate, SlimLine, ZXP and the Northgate logo are U.S. trademarks or registered U.S. trademarks of Northgate Computer Systems. 80486SX and 80486 are trademarks of Intel. MS-DOS, Windows and the Windows logo are trademarks of Microsoft Corporation. All other products and brand names are U.S. trademarks or registered U.S. trademarks of their respective owners. Prices and specifications subject to change without notice. Prices shown do not include shipping, handling, insurance and destination taxes. Northgate reserves the right to substitute components of equal or greater performance. All items subject to availability. We support the original use of all software. To report software copyright violations, call the Software Publishers Association at 1-800-388-4888. All systems shipped with DOS 5.0 and Windows 3.1 software. **Monthly lease payments are based on a 24-month standard four-year-old value depreciation of less than 12% with no down payment available for qualified businesses.

CODE A4615

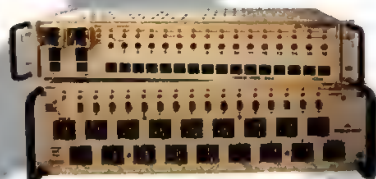
FOR TOKEN RING

At all levels of a mission-critical network, you need fast response. In configuring the network. In exchanging data. In monitoring performance. And in getting technical help. For token ring, no one responds faster than Thomas-Conrad.

For more information on our full family of token ring products, call us today. ♦



LAN TIMES
READERS
CHOICE
1992



Enhanced Multistation Access Units

COMMUNICATES

Choose Thomas-Conrad for high-speed communication that's compatible with the IBM® and IEEE standards. These adapters support 16-bit bus-mastering and non-bus-mastering PC XT/AT compatibles, and 32-bit bus-mastering Micro Channel machines. At 4- or 16Mbps, you save money with our built-in media filters, for direct connection to either unshielded or shielded twisted-pair cabling. And you can quickly pinpoint problems by checking the diagnostic LEDs on the end bracket.



4Mbps and 16Mbps Token Ring Adapters

CONNECTS

Simplify network connectivity and reduce costs with Thomas-Conrad MAUs. They give you 16 ports – twice the usual number – plus diagnostic LEDs, enable/disable switches for each port, and a built-in AC power supply. And, they let you connect workstations on 4- or 16Mbps networks, using either unshielded or shielded twisted-pair cabling.

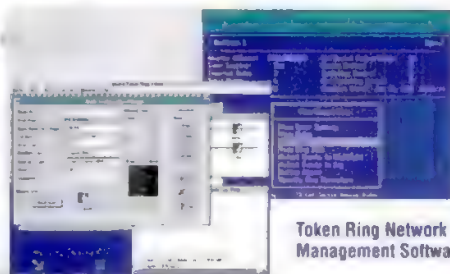
CONTROLS

SEE US AT
NETWORLD 92
OCTOBER 13-15 • DALLAS
DALLAS CONVENTION CENTER

SEE US AT COMDEX
BOOTH #4647



Keep your token ring environment looking picture-perfect with our new, easy-to-use client/server-based diagnostic software called Sectra™. Sectra consists of two modules; a NetWare® Loadable Module for NetWare servers, and a client module for workstations. Sectra lets you set alert threshold levels and control node access. It collects data in real time, and shows you exactly what's going on, so you can head off problems before they become critical. And, Sectra Client works with Microsoft® Windows™, giving you point-and-click access to network control functions.



Token Ring Network Management Software

800-332-8683

Only Thomas-Conrad gives you toll-free technical support, 7 days-a-week, 24 hours-a-day, absolutely FREE. And, we carefully test and burn in each product we manufacture in our Austin, Texas facility – that's your assurance of the highest quality and reliability.

1908-R Kramer Lane, Austin, TX 78758; (512) 836-1935
In Canada, (800) 654-3822.

CIRCLE 330 ON READER SERVICE CARD

THOMAS • CONRAD
CORPORATION



PHOTO: CHIP SIMONS

POWER PROTECTORS

Surge Suppressors Clamp Down on Spikes

Deciding on the proper way to defend your computer and peripherals against power problems has gotten tougher in the last few years, partly because of the proliferation of increasingly sensitive electronics and the growth of networks. It's bad enough when your standalone PC takes a hit from some electrical outlaw, losing important data in the process. But if that same PC connects with other hardware through a data line, you run the risk of damage to multiple systems.

Users concerned over data loss and equipment damage can gain protection against some electrical anomalies with a surge suppressor. For this review, we tested 30 products designed for North American power distribution lines. Be-

Power disturbances capable of damaging your equipment come from more than just lightning and may be heading toward your PC. We review 30 surge suppressors that can protect your system. The devices cost from \$13 to \$399, but higher cost doesn't necessarily mean better protection.

by Gary Berline and Catherine Kunkemueller

yond the 30 vendors whose products we saw, another dozen surge suppressor companies exist but either didn't offer products that met our review criteria or couldn't provide a unit on time.

CONCRETE ADVICE

There are a few general points to keep in mind when selecting a surge suppressor. First, look for a UL (Underwriters Laboratories) 1449 listing on the product. UL is an independent company that tests appliances for safety, and the UL 1449 listing indicates that the product meets minimum safety standards for surge suppressors.

Next, don't assume that better protection comes at a higher price. Reviewed units ranged from \$12.95 for GC Electronics' Power Management System 64-631 to \$399 for Current Technology's Power Siftor Pro 15, but tests performed by ZD Labs show no correlation between the highest price and the best performance. Two of the more moderately priced units—Brooks Electronics' \$80.45 Surge Reactor BN6-6 and the \$105 Data Shield S100—provided top performance, surviving a punishing barrage of surges to

earn Editors' Choice. Of the 30 products tested, only these and the more costly units from Innovative Technology (\$265) and Zero Surge (\$199) provided exemplary performance, allowing less than 500V to pass through them into our simulated PC on our Pass-Through Voltage tests. Nineteen other units performed adequately, surviving our Pass-Through Voltage test spikes while allowing no more than 800V per surge to pass into the simulated PC—the maximum that our tests showed a computer's power supply can handle on its own.

Some vendors claim their products will respond to surges in less than one nanosecond (one billionth of a second), but this should not be a factor in your decision. According to François Martzloff, Electronics Engineer of the National Institute of Standards and Technology and an acknowl-

edged industry expert on conducted transients, such quick response times are unnecessary. Super-fast spikes can certainly occur, but they are quickly attenuated in a building's wiring before they ever make it to your computer.

Most vendors offer warranties that range from replacement of the surge suppressor only to repair or replacement of whatever equipment was plugged into it as well. Some of the latter warranties have a dollar limit, which can range from \$5,000 (for the Data Shield S100 and the L.E.A. Dynatech CS-615) to \$2 million for Brooks

Power Systems' Surge Stopper BPS-BN6-6. The systems we reviewed from EFI Electronics Corp., Geist, Jayco Electronics, Panamax, Perma Power Electronics, Power Sentry, and SL Waber don't put a maximum dollar amount on repairs or replacements. Keep in mind, however, that unlimited replacement sometimes means coverage under the vendor's liability insurance. So in some cases, you may wind up dealing with an insurance company rather than directly with the manufacturer.

More important, none of the warranties offered by these vendors cover the cost of replacing the valuable data you've lost.

REVIEW CRITERIA

To participate in this review, products had to have protection on each of the three possible power distribution lines (hot to neutral, neutral to ground, and hot to ground). The suppressors also had to have the UL 1449 listing and at least six outlets (enough to accommodate a PC and most peripherals). We also requested that units be equipped with EMI/RFI (electromagnetic interference/radio-frequency interference) noise filtration.

We did not review any product licensed from an OEM (original equipment manufacturer) unless it differed in an important respect from the original device, as the Pass & Seymour/LeGrand C6-L does from the Max 6 from Pana-

Two moderately priced surge suppressors provided top performance on our series of tests, surviving a punishing barrage of power surges.

HIGHLIGHTS

Surge Suppressors

SURGE SUPPRESSORS protect your PC from the damage that can result from a particular kind of overvoltage known as a spike. Uninterruptible power supplies protect against under-voltages such as sags, brownouts, and blackouts.

A PC POWER SUPPLY can handle spikes as high as 800V unassisted. A surge suppressor that kicks in at 500V provides the margin of safety you want.

ALL 30 SURGE suppressors in this review carry the UL 1449 listing. Most have protection on all three lines (hot, neutral, and ground) and use MOVs (metal oxide varistors) to divert excess energy to the ground. The one exception is the Zero Surge ZS1800 Surge Eliminator, which uses coils and electrolytic capacitors and diverts

excess energy to the neutral rather than the ground line.

THE PRODUCTS that we tested cost from \$12.95 to \$399, but the most expensive unit isn't always the best. The moderately priced Surge Reactor BN6-6 (\$80.45) and the Data Shield S100 (\$105) allowed only 500V or less to pass through them on ZD Labs' tests.

MOV'S DEGRADE over time; a number of the MOV-based units showed some degree of degradation on our tests.

THE ZERO SURGE device also performed well on our tests, with some of the lowest pass-through voltages we saw, and no significant degradation. It doesn't protect against common-mode disturbances, however.

max, an OEM. The difference between the units lies in their pass-through voltage ratings. For this review, we looked only at floor-strip surge suppressors.

One exception to some of these filters is Zero Surge's ZS1800 Surge Eliminator, which provides protection only between the hot and neutral wires and lacks EMI/RFI noise filtration. But the Zero Surge unit does have the distinction of representing an important technological break from typical surge suppression and is innovative enough to warrant a spot in this review.

If you often use devices that have plug-in transformer cubes, such as laptops and modems, you may be interested in surge suppressors that accommodate two cubes without covering up an outlet. About half of the systems reviewed here fill the bill: the Surge Arrest Plus, Supertrac ST6D, Power Sifter Pro 15, Ultimate SRF-6MO/S, Suppress-All AC-6, Power Tree 50, L.E.A. Dynatech CS-615, Pyramid, Panamax Max 6, Pass & Seymour/Legrand C6-L, Isobar 8, Woods 5623 Surge Suppressor, and Zero Surge ZS1800 Surge Eliminator.

Also consider whether you'll need an unswitched outlet. This type of outlet stays on continuously so you can plug in a device that should not be shut off at the end of the day, such as a clock. The Electripak 6SSU and Kensington Microware's Power Tree 50 come with unswitched outlets, while all the outlets on the Data Shield S100 are unswitched. A 6-foot or larger cord, provided by most of these units, should be ample for most users.

If you prefer easier access to your floor-strip surge suppressor, consider a remote switch. AESI/StediWatt offers a \$35 option that lets you equip many of its suppressors, including the Diagnostic Power Refinery, Model 718, with a remote switch. Remotemax gives suppressors from Panamax remote-switch capability; it costs \$15.95. Or you can opt for Perma Power Electronics' \$21.30 Perma Power Model R119, a remote switch that can plug into most surge suppressors. Brooks Electronics, Brooks Power Systems, Proxima Corp., and Tripp Lite offer models with remote switches (not tested here).

Another way to make surge suppres-

sion more convenient is to buy an under-the-monitor power console. Consoles, which generally cost about \$50 more than floor-strip models, are more likely to offer separate switches for each outlet or provide other amenities.

POWER PROBLEMS

Electrical power always brings with it the possibility of anomalies, some of which

can damage the delicate pieces in your PC. Electrical disturbances fall into three categories: noise, undervoltages, and overvoltages. These can travel over any of the three power distribution lines—hot, neutral, and ground—that connect to your outlet. (See the sidebar "From Power Plant to PC: How Power Travels" for more information on how power gets to your outlet.) Surge suppressors deal



EDITORS' CHOICE

- Brooks Electronics' Surge Reactor BN6-6
- Data Shield S100

Of the 30 surge suppressors in this roundup, only 4 survived all of our tests with pass-through voltages of 500V or less (comfortably below the 800V maximum voltage that our tests showed a typical PC power supply can handle on its own). Among this

select group, two units stand out because of their superior mix of price and performance: Brooks Electronics' Surge Reactor BN6-6 and the Data Shield S100.

The \$80.45 Surge Reactor BN6-6 from Brooks Electronics demonstrates that a moderate price tag can be accompanied by strong performance.

The Brooks Electronics unit consistently led the pack with the lowest pass-through voltages on each of our Pass-Through Voltage tests. The system relies on MOVs rated at 330V pass-through voltage. Still, the Surge Reactor BN6-6 performed well on our degradation tests.

PROTECTION FROM DATA SHIELD

Our other Editors' Choice winner in this category is the \$105 Data Shield S100 from Data Shield (which was recently acquired by Tripp Lite). The S100, with its 400V pass-through rating, achieved low pass-through voltage scores; the Data Shield also did well on our Degradation tests.

The Data Shield S100's resistance to wear may be partially attributed to its gas tube; these tubes are more capable of handling the sort of extreme voltages that degrade MOVs.

WORTHY OF NOTE

The \$199 Zero Surge ZS1800 Surge Eliminator is noteworthy for its ground-breaking technology. While we cannot award an Editors' Choice or even an honorable mention to a surge suppressor that does not protect against common-mode surges (which industry experts consider to be potentially destructive), the makers of the Zero Surge device deserve credit for trying to advance the industry's technology.

Zero Surge's non-MOV-based approach to surge suppression allows the ZS1800 Surge Eliminator to avoid the problems of degradation that are common to most of the MOV-based suppressors. In addition to being one of the devices to allow fewer than 500V through on all our Pass-Through Voltage tests, the ZS1800 Surge Eliminator exhibited no degradation.

The Innovative Technology SPIU-6 deserves kudos for its fine performance on our Pass-Through Voltage tests, but less praise for its \$265 price. Additionally, the fact that the unit was filled with epoxy resin, completely surrounding its components, leaves some uncertainty as to whether it can dissipate heat effectively after continued use.

only with overvoltages and noise.

Technically, *noise* refers to any unwanted signal, but we'll use the word to mean those signals that vary rapidly between relatively low amplitudes (1 volt to 10 volts) and are superimposed on the signal you want: the AC (alternating current) voltage wave that the PC's power supply uses. Noise of this sort stems mostly from EMI/RFI, which emanates from fluorescent lights, radio transmissions, and even your PC's switching power supply.

Many surge suppressor vendors warn about noise's potential for tripping up

programs and causing data corruption. In fact, early conversations with vendors led us to consider EMI/RFI filtration an important criteria for the review. The more we researched the topic, however, the clearer it became that EMI/RFI filtration is more a marketing tool than a real concern for PC users, simply because PC makers have already built in most of the noise filtration that your system is likely to need.

PC makers are concerned about noise because it's not generated outside a computer only: A PC in the act of processing creates internal noise. For PCs to meet

FCC emissions requirements, they must include filters that catch noise, including noise that tries to sneak back onto the power line. These filters suppress noise trying to enter the PC as well, reducing the need for external noise blocking.

Undervoltages, anything below the roughly consistent or *nominal* 120 volts normally delivered to your wall plug, form another class of power anomalies. Undervoltages won't damage your PC, but they may rattle your data. There are three types of undervoltages—sags, brownouts, and blackouts—and surge suppressors cannot protect against any of them. To defend against these, you'll need a UPS (uninterruptible power supply).

Overvoltages, any electric potential above the expected 120V norm, can cause a component to die immediately or to undergo latent failure, a situation in which the component operates erratically until another power hit takes it down for good. Surge suppressors only protect against a particular kind of overvoltage, known as a spike. *Spikes* are disturbances lasting only from a few nanoseconds to a millisecond (one millionth of a second) that can raise the voltage to more than 6,000 volts, distorting the contour of the AC waveform.

Although spikes of more than 6,000 volts can occur, they are so rare that the IEEE (Institute of Electrical and Electronics Engineers) recommends 6KV (kilovolts) as a working limit for manufacturers designing suppressors. (You shouldn't expect any surge suppressor, or whatever's plugged into it, to survive any spike more powerful than that.) The chance for disruption or damage goes up with decreasing *rise time* (how long the spike takes to approach its peak), increasing voltage, and lengthening duration.

While direct lightning strikes along the transmission path cause the most powerful spikes, strikes that merely come close to the wire can produce spikes as well. The tremendous current in a lightning bolt can, by induction, produce a serious disturbance in nearby buildings or even underground lines.

Although less severe than lightning-induced disturbances, those caused by utility load-switching occur much more often (for example, when the power company reroutes the lines to or from a trans-

A Surge Suppressor Glossary

capacitance The ability of an object to store electric charge. Devices working on this principle are called **capacitors**.

common mode A term used to refer to a hot-to-ground or hot-to-neutral disturbance.

clamping voltage The voltage level at which a suppressor acts to prevent any further rise in voltage. See **pass-through voltage**.

current A flow of charge from one point to another caused by a difference in electric potential.

generator A machine that converts mechanical energy into electric energy.

ground In power-delivery systems, a conductor driven into the ground to provide a current path to it. In electronics, a common point of connection for circuits in a system.

ground skew Differences in ground potential, caused by a wire's impedance.

hot wire A current-carrying wire that delivers power from a utility company. See **phase**.

impedance The frequency-dependent opposition to current in AC systems.

induction The phenomenon that causes charges to move through a conductor when the conductor cuts through a magnetic field.

metal oxide varistor (MOV) A surge suppression device that consists of zinc crystals and other elements.

neutral A conductor that carries a current back to its source.

normal mode or **differential mode** Terms that are used when referring to a line-to-neutral disturbance.

nominal voltage The voltage that a power company tries to maintain.

overvoltage A power disturbance that results in too much voltage.

pass-through voltage The voltage that a surge suppressor lets through when hit with an irregular voltage input. See **clamping voltage**.

phase Voltage on two hot wires reaches any chosen amplitude at different times on each wire. The time lag (or lead) is called the phase. Hot wires are also called **phase wires**.

resistance The opposition to the flow of charge (current) in a conductor.

service entrance The place inside a building where power from the utility company enters and connects with the building wiring.

spike Sometimes called **transients**, spikes are brief (no more than a millisecond) but potentially destructive rises in voltage.

surge A term used to refer to power swells or spikes.

transformer A device that uses inductors to raise or lower voltage.

Three things you can do to reduce your PC administration time.



Clone yourself.

LAN ADMINISTRATOR

Superior communication skills required. Applicant must have the patience of a saint, be security conscious, and like working ridiculous hours.

Hire an assistant.

Add a low-priced network-ready HP 486 PC to your network.



Now you don't need more of you to help administer your network. Just more new HP network-ready PCs.

In just minutes, our powerful, full-function 486N PCs can be humming away on your network. You just plug them in and go back to more critical missions. You don't even have to add adapter cards and boot-ROMs. We've already built them into certain models.

Our complete security features are so convenient your users will actually use them. And with your own administrative password, you can maintain full control of security and configuration settings.

Ranging from 25 MHz to our sizzling 66 MHz model, these 486N PCs fit easily into multivendor environments. They work perfectly as standalone units, too, until you're ready to net-

work. Perhaps most amazing of all, they're priced under \$1,300.*

For immediate, specific information, call 208-344-4809 from your FAX handset. Then get more of what you need most. Time.



**HEWLETT
PACKARD**



■ Surge Suppressor Product List

The vendors represented in this story offer a variety of products. See the Summary of Features for a list of additional surge suppressors in their product lines. The products we tested and the company names and addresses are listed here, alphabetically by product.

Data Shield S100

Data Shield, 500 N. Orleans, Chicago, IL 60610; 312-329-1777

Diagnostic Power Refinery, Model 718

AESI/StediWatt, 2005 Lincoln Way East, Chambersburg, PA 17201; 800-733-3155, 717-263-5681

Electripak 6SSU

Electripak, a division of Thomas and Betts/American Electric, 1555 Lynnefield, # 250, Memphis, TN 38119; 800-888-0211

Electricord XP

Pacific Electricord Co., 747 W. Redondo Beach Blvd., P.O. Box 10, Gardino, CA 90247; 800-326-8887, 310-532-6600

General Semiconductor 1206K6

General Semiconductor Industries Inc., 2001 W. Tenth Pl., Tempe, AZ 85281; 800-927-8743, 602-968-3101

Inland 3 Mode Surge Protector

Inland Corp., 32046 Edward, Madison Heights, MI 48071; 800-969-3705

Innovative Technology SPIU-6

Innovative Technology Inc., 15470 Flight Path D., Brooksville, FL 34609; 904-799-0713

Isobar 8

Tripp Lite, 500 N. Orleans, Chicago, IL 60610; 312-329-1777

Joslyn Model 1203-03 Surge Suppressor

Joslyn Electronic Systems Corp., P.O. Box 817, Goleta, CA 93116; 800-752-8068, 805-968-3551

L.E.A. Dynatech CS-615

L.E.A. Dynatech, 6520 Harney Rd., Tampa, FL 33610; 800-654-8087, 813-621-1324

Panamax Max 6

Panamax, 150 Mitchell Blvd., San Rafael, CA 94903; 800-472-5555 (USA), 800-443-2391 (Canada), 415-494-3900

Pass & Seymour/Legrand C6-L

Pass & Seymour/Legrand, P.O. Box 4822, Syracuse, NY 13221; 800-776-4035, 315-468-6211

Perma Power RS610

Perma Power Electronics Inc., 5601 W. Howard Ave., Chicago, IL 60648; 800-323-4255, 312-763-0763

Power Management System 64-631

GC Electronics Co., 1801 Morgan St., Rockford, IL 61102; 815-968-9661, 800-435-2931

Power Siftor Pro 15

Current Technology Inc., 101 W. Buckingham Rd., Richardson, TX 75081; 800-238-5000, 214-238-5300

Power Tree 50

Kensington Microware Ltd., 2855 Campus Dr., San Mateo, CA 94403; 800-535-4242, 415-572-2700

PowerTrax 2000

EFI Electronics Corp., 2415 South 2300 W., Salt Lake City, UT 84119; 800-877-1174, 801-977-9009

ProLine 30

Proxima Corp., 6610 Nancy Ridge Dr., San Diego, CA 92121; 800-447-7694, 619-457-5500

Pyramid

NCR Corp., 1334 South Patterson Blvd., USG-2, Dayton, OH 45479; 800-262-7782

Ruby Plus

Curtis Manufacturing Co. Inc., 30

Fitzgerald Dr., Jeffrey, NH 03452; 800-548-4900, 603-532-4123

Supertrac ST6D

Control Concepts Corp., a subsidiary of Liebert Corp., 328 Water St., P.O. Box 1380, Binghamton, NY 13902; 800-288-6169, 607-724-2484

Suppress-All AC-6

Jayco Electronics Inc., 10 Sunray St., Unit #1, Whitby, Ontario, Canada L1N 9B5; 800-668-6587, 416-430-1650

Surge Arrest Plus

American Power Conversion, 132 Fairgrounds Rd. West, Kingston, RI 02892; 800-800-4272, 401-789-5735

Surge Protector 300 Plus Model 106

Power Sentry Inc., 6543 City West Pkwy., Minneapolis, MI 55344; 800-852-4312, 612-942-6655

Surge Reactor BN6-6

Brooks Electronics Inc., 4001 N. American St., Philadelphia, PA 19140; 800-523-0130, 215-228-4433

Surge Sentry DL6D

SL Waber Inc., 520 Fellowship Rd., #306-C, Mt. Laurel, NJ 08054; 800-634-1485, 609-866-1845

Surge Stopper BPS-BN6-6

Brooks Power Systems, 1400 Adams Rd., Unit E, Bensalem, PA 19020; 800-523-1551

Ultimate SRF-6MO/S

Geist Inc., Flexiduct Division, P.O. Box 83088, Lincoln, NE 68501; 800-432-3219, 402-474-3400

Woods 5623 Surge Suppressor

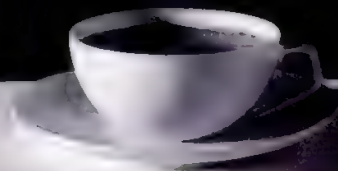
Woods Wire Products Inc., 510 Third Ave., Carmel, IN 46032; 800-428-6168, 317-844-7261

Zero Surge ZS1800 Surge Eliminator

Zero Surge Inc., 103 Clarmont Rd., Bernardsville, NJ 07924; 908-766-4220

Three things that please both you and your PC users.

Decent coffee.



Six-week paid vacations.



HP's upgradable 486 PCs, including the hot 66 MHz model.



Now you can give your PC users all the performance they're hungry for. At prices that won't eat away at your budget.

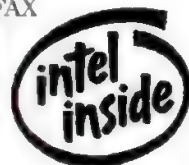
Our four new 486U PCs make running Windows and CAD a tropical breeze. With eye-popping graphics and lightning-fast response. Whether you start with 66 MHz now or upgrade to it later.

Our 25, 33, 50 and 66 MHz models will keep your users on top of the performance world, today and in the future. And while they're getting what they want, so are you.

These PCs are designed to reduce your administration headaches faster than strong coffee. They're easy to set up. Extremely simple to service. Industry standard and full function. So they'll fit right into your multivendor environment.

Their complete security features are so convenient your people will actually use them. Which will take another load off your shoulders.

For immediate, specific details, call 208-344-4809 from your FAX handset. It will make upgrading your operation a real pleasure.



**HEWLETT
PACKARD**

■ From Power Plant to PC: How Power Travels

by Gary Berline and Angela Gunn

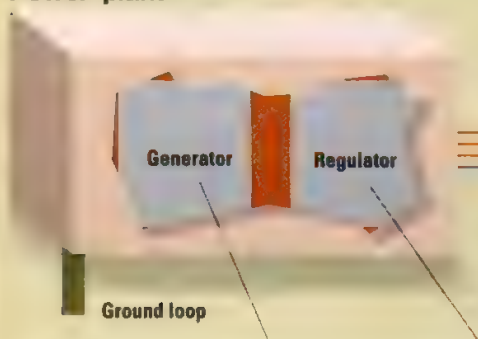
To ensure that the power you receive is reasonably clean (in other words, that the voltage is constant and as free of power anomalies as possible), electricity is regulated at the power plant. From there, transformers at various stops en route to your building step the

voltage up or down. Each stop is grounded through either a rod or a loop and has a surge arrestor (with the possible exception of the building).

The configuration shown is for metropolitan distribution. Some of the lines between the plant and the endpoint are redundant, so that if one

line becomes damaged, power will not be lost. Rural areas commonly use radial (nonredundant) distribution. This diagram shows a three-phase, four-wire system (the three hot lines and one neutral line all carry electricity, and current returns through the neutral line).

Power plant

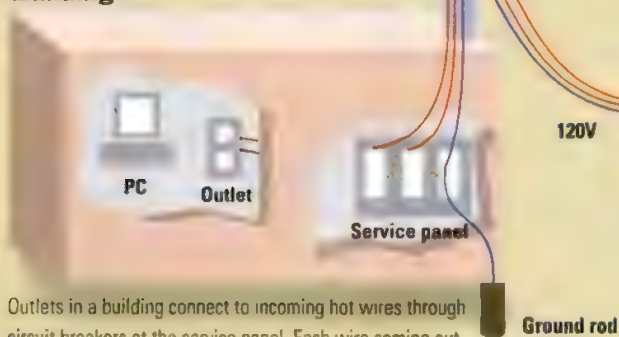


In the **power plant**, the generator's windings produce electricity (usually at 20KV) as they rotate (usually at 3,600 rpm).

The **regulator** attempts to maintain constant voltage. Swells and sags can occur at the regulator either by accident or, in the case of sags, when the power company is trying to lower energy consumption.

As the power enters your building, it passes through the **service entrance**. At the service panel, two hot wires bond to separate bus bars. The neutral wire bonds to the neutral bus bar, which itself bonds to a grounding rod (in accordance with the National Electric Code). This bonding of the neutral and ground lines prevents any neutral-to-ground spikes from entering the building.

Building



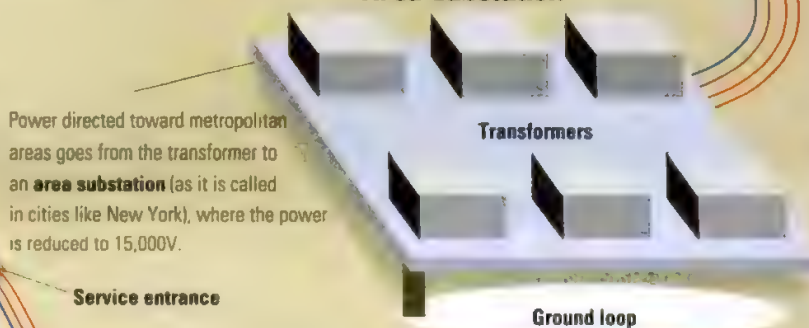
Outlets in a building connect to incoming hot wires through circuit breakers at the service panel. Each wire coming out of a circuit breaker feeds one or more outlets; this connection is called a **circuit**. Each outlet is serviced by a hot wire, a neutral wire, and a ground wire. Sags, spikes, and noise can all occur inside the building.

Bulk power station



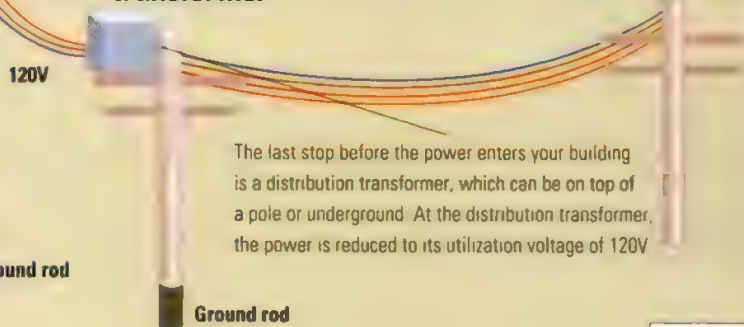
After it passes through the regulator, the power goes to a **bulk power station**, where it runs through one of several transformers. The voltage is transformed upward and sent out either to distant substations or to other utilities at (345,000V), or to substations in the service area (at 138,000V).

Area substation

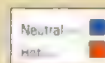


Power directed toward metropolitan areas goes from the transformer to an **area substation** (as it is called in cities like New York), where the power is reduced to 15,000V.

Distribution transformer



The last stop before the power enters your building is a distribution transformer, which can be on top of a pole or underground. At the distribution transformer, the power is reduced to its utilization voltage of 120V.



HARDWARE

Power Protectors

former). Spikes also occur any time the current is interrupted: for instance, when you turn off your printer.

HOW THEY WORK

Surge suppressors sense when power rises above the normal level and prevent the excess energy from reaching your PC. The threshold at which a surge suppressor starts to react against a spike is called the *clamping voltage*. A system's clamping voltage will be the same as its *pass-through voltage*, the amount of voltage that passes through the device before it becomes conductive. UL tests the pass-

Most manufacturers of products based on MOVs will tell you that the lower a suppressor's pass-through voltage is, the better it will protect your system.

through voltage of surge suppressors for each available line (hot to neutral, neutral to ground, and hot to ground). The company's lowest pass-through voltage rating is 330V; the next is 400V. From there, pass-through ratings are applied upward in increments of 100V. (A suppressor with a low pass-through voltage will begin clamping down on spikes rated at those low voltages, but the device may wear out sooner than products with higher pass-through voltage ratings.)

The Zero Surge ZS1800 Surge Eliminator stands apart from the other devices in this review. Rather than using MOVs (metal oxide varistors)—the major component found in all the other systems we reviewed—the ZS1800 first uses a large coil to absorb and reflect some of a spike's power, then follows with electrolytic capacitors that temporarily store any excess energy.

The other units in our roundup divert spikes to ground, a practice the Zero Surge designers eschew, using the neutral line instead. Protecting only between hot and neutral, however, precludes any sig-

nificant safeguard on either hot-to-ground or neutral-to-ground. As a result, the ZS1800 Surge Eliminator shows a UL suppression rating of 330V on hot-to-neutral, but no rating on the other combinations. As demonstrated by ZD Labs' tests, however, the device still has some protective elements on these two lines, though these elements are not as powerful as its main coil.

Almost across the board, manufactur-

ers of products based on MOVs will tell you that the lower a suppressor's pass-through voltage is, the better it will protect your system. None of the MOV-based products we saw had greater than a 400V pass-through rating on the hot-to-neutral line, where the most severe spikes take place.

But according to Martzloff of the National Institute of Standards and Technology, MOVs with low pass-through

isobar® — THE BEST SURGE SUPPRESSOR JUST GOT BETTER!

BETTER FEATURES

We took Isobar®, the world's best surge suppressor, and gave it the **Ultra** enhancement. Now, in addition to premium AC surge and noise protection, the new **Isobar® Ultra** has:

DIAGNOSTIC CIRCUITRY

LEDs alert you of

- Improper outlet wiring
- Damage to protection circuitry
- Loss of AC power

INSTANTANEOUS RESPONSE

Suppresses spikes quicker to protect your equipment better.

ISOLATED FILTER BANKS

Eliminates interference between plugged-in equipment.

BETTER WARRANTY

Only Isobar® Ultra provides lifetime **Ultimate® Insurance** that covers any surge related equipment failures up to \$25,000—including lightning strikes.

Isobars are available with 2, 4, 6 or 8 outlets, some with fax/modem protection. Call us today to see a sample.

TRIPP LITE
"THE POWER PEOPLE"
500 N. Orleans • Chicago, IL 60610
312/329-1777 • FAX: 312/644-6505

UL 1445 (330 volt let-thru)
128C (noise filtering)
497A (data-line protection)

ULTIMATE®
\$25,000
Lifetime Insurance

70
YEARS OF
MANUFACTURING
EXCELLENCE

MADE IN USA

isolated protection 5.0 VHZ.

isobar® Magnetic Surge Suppressor

PROTECTION PRESENT LINE FAULT LINE PRESENT

SOLATED FILTER BANK

Resellers circle 173 on reader service card

End-users circle 174 on reader service card



WHAT, EXACTLY, IS ACCEPTABLE RISK?

Last night you powered down a cholesterol-rich pasta with cream sauce. This morning you jaywalked across a busy four-lane street, and next weekend you're going to trust some nineteen-year-old who tells you there's no way the bungee cord can break.

Next to that, choosing new computer equipment is merely career threatening.

We don't think it should be quite so risky. Which explains the existence of NetWare®, Novell's networking software that unites such strange bedfellows as IBM and Sun; Oracle and Microsoft.

NetWare not only preserves investments you've made, it'll accommodate whatever decisions you make next year. Our eighth generation products are the result of alliances we've built with over 2500 software, hardware and systems vendors, who've designed and tested thousands of *their* products to work with ours.

Which means you really only have to ask one question to make your next risk an acceptable one. "Does it run with NetWare?"



The Past, Present, and Future of Network Computing.

FOR MORE INFORMATION, CALL 1-800-NETWARE

► **S U M M A R Y O F F E A T U R E S**

Surge Suppressors



In alphabetical order by company

■ = YES □ = NO

	AESI/StediWatt Diagnostic Power Refinery, Model 718	American Power Conversion Surge Arrest Plus	Brooks Electronics Surge Reactor BN6-6	Brooks Power Systems Surge Stopper BPS-BN6-6	Control Concepts Supertrac ST6D	Current Technology Power Sifter Pro 15
List price	\$139.00	\$99.95	\$80.45	\$94.95	\$169.95	\$399.00
Physical Characteristics						
Power cord length (inches)	75	72	72	72	60	72
Case material	Aluminum	Plastic	Metal	Aluminum	Plastic	Aluminum
Number of outlets	7	7	6	6	6	6
Socket arrangement	Single row	Single row	Single row	Single row	Two rows	Single row
Technology						
Capacitors	■	■	■	■	■	□
Coils	□	■	■	■	■	□
Gas tubes	□	□	□	□	□	□
Inductors	□	■	□	□	■	□
Number of MOVs (metal oxide varistors)	6	7	3	5	6	14
Size of MOVs (mm)	22	20	20	20	20	20
Silicon avalanche diodes	□	□	■	■	□	□
UL Ratings (Pass-through Voltage)						
Hot-to-neutral line	330V	330V	330V	330V	330V	330V
Neutral-to-ground line	330V	330V	330V	330V	400V	330V
Hot-to-ground line	330V	330V	330V	330V	400V	330V
Phone jack	Optional (\$20)	■	□	□	■	■
UL 479A-listed phone protection	□	■	N/A	N/A	■	□
General Features						
Power-on light	■	■	■	■	■	■
Separate on/off switches for individual outlets	□	□	□	□	□	□
LED display for surge suppressor activity	■	■	■	■	■	□
Circuit breaker	15 amps	15 amps	15 amps	15 amps	15 amps	15 amps
Warranty						
Length of standard warranty	5 years	Lifetime	Lifetime	Lifetime	10 years	Lifetime
Warranty covers damage to connected equipment	■	■	□	■	□	□
Maximum dollar amount covered	\$20,000	\$25,000	N/A	\$2 million	N/A	N/A
Miscellaneous						
Technical support hours (Eastern time)	8:00-6:00 M-F	8:00-8:00 M-F	8:00-5:00 M-F	9:00-7:00 M-F	8:00-5:00 M-F	7:00-4:00 M-F
Sampling of other surge suppressors in company line (with price, number of outlets, UL-listed pass-through voltage on all lines)	Pure Power Express Telemate, Model 322T (\$79, 2, 330V); Diagnostic Power Refinery, Model 28 (\$85, 2, 330V); Diagnostic Telemate Refinery, Model 618T (\$119, 6, 330V)	S7 (\$29.95, 4, 330V); S3P (\$39.95, 4, 330V); S7P (\$59.95, 4, 330V)	VCN 6-6 (\$43.53, 6, 330V); VCNR 6-6 (\$55.56, 6, 330V); VPM 4-6 (\$61.07, 4, 330V)	VCN 6-6 (\$49.95, 6, 400V); VCN4-FAX (\$69.95, 4, 400V); AT6-6 (\$114.95, 6, 330V)	ST2 (\$123.95, 2, 330V); ST2D (\$143.95, 2, 330V); ST6 (\$148.95, 6, 330V)	Plus 10 (\$169, 6, 330V); Plus 15 (\$189, 6, 330V); Pro 10 (\$339, 6, 330V)

N/A—Not applicable: The product does not have this feature

HARDWARE
Power Protectors

EDITOR'S CHOICE									
Curtis Manufacturing Ruby Plus	Data Shield S100	EFI Electronics PowerTrax 2000	Electripak 6SSU	GC Electronics Power Management System 64-631	Geist Ultimate SRF-6MO/S	General Semiconductor Industries 1206K6	Inland 3 Mode Surge Protector	Innovative Technology SPIU-6	
\$119.95	\$105.00	\$99.95	\$28.95	\$12.95	\$79.95	\$96.00	\$25.00	\$265.00	
72	72	72	48	72	72	72	48	60	
Plastic	Plastic	Plastic	Metal	Steel and enamel	Plastic	Metal	Plastic	Plastic	
6	6	6	6	6	6	6	6	6	
Two rows	Two rows	Single row	Single row	Single row	Two rows	Single row	Single row	Two rows	
■	■	■	■	■	■	□	■	Info not available	
■	■	■	□	□	■	□	□	Info not available	
□	■	□	□	□	□	□	□	Info not available	
□	□	□	□	□	□	□	□	Info not available	
6	4	6	3	3	4	8	3	Info not available	
14	22	18	20	14	20	20	14	Info not available	
□	□	■	□	□	■	■	□	Info not available	
400V	400V	330V	330V	330V	330V	330V	400V	330V	
400V	400V	330V	330V	330V	330V	330V	400V	330V	
400V	400V	400V	330V	330V	330V	330V	400V	330V	
■	□	■	□	■	□	□	□	□	
■	N/A	■	N/A	■	N/A	N/A	N/A	N/A	
■	■	■	■	■	■	■	■	■	
□	□	□	□	□	□	□	□	□	
■	□	■	■	■	■	■	■	■	
15 amps	10 amps	15 amps	15 amps	15 amps	15 amps	15 amps	15 amps	10 amps	
Lifetime	Lifetime	Lifetime	5 years	5 years	Lifetime	5 years	Lifetime	5 years	
□	■	■	□	□	■	□	□	□	
N/A	\$5,000	Unlimited	N/A	N/A	Unlimited	N/A	N/A	N/A	
8:00-5:00 M-F	7:00-5:30 M-F	10:00-3:00 M-F	8:00-5:00 M-F	7:00-4:00 M-F	7:00-4:00 M-F	7:00-4:00 M-F	8:30-6:00 M-F	8:00-5:00 M-F	
Emerald (\$69.95, 6, 400V); Remote Ruby (\$109.95, 6, 400V); Command Center (\$149.95, 5, 330V)	CPP12FM (\$54.95, 6, 400V); 575 (\$69.95, 4, 400V); Mac Director (\$139, 5, 400V)	P-DES (\$29.95, 6, 400V); P-IES (\$69.95, 6, 400V); C-3ES (\$149.95, 5, 400V)	4SF (\$43.15, 4, 330V); 6SSU-A (\$48, 6, 330V)	64-130 (\$5.95, 1, 400V); 64-680 (\$8.95, 3, 400V); 64-690 (\$19.95, 6, 400V)	RF-6MO/S (\$59.95, 6, 400V); Wireless RC-8MO/S (\$124.95, 5, 400V); TL-777A (\$149.95, 6, 400V)	120K15A (\$103, 2, 330V); 120KMP1 (\$136, 2, 330V); 120K232 (\$147.40, 2, 330V)	0302 (\$9.95, 1, 400V); 03183 (\$13.90, 6, 400V); Progarde 3 (\$69.95, 6, 400V)	SPIU-2 (\$140, 2, 330V); SPIU-8 (\$285, 8, 330V)	

CONTINUES

HARDWARE

Power Protectors

► SUMMARY OF FEATURES

In alphabetical order by company						
■ = YES □ = NO	Jayco Electronics Supress-All AC-6	Joslyn Electronic Systems Model 1203-03 Surge Suppressor	Kensington Microwave Power Tree 50	L.E.A. Dynatech CS-615	NCR Pyramid	Pacific Electricord XP
List price	\$79.00	\$180.00	\$64.95	\$98.00	\$149.00	\$14.95
Physical Characteristics						
Power cord length (inches)	72	72	108	72	72	72
Case material	Plastic	Aluminum	Plastic and steel	Plastic	Plastic	Plastic
Number of outlets	6	6	6	6	6	6
Socket arrangement	Two rows	Two rows	Two rows	Two rows	Two rows	Single row
Technology						
Capacitors	■	■	■	□	□	■
Coils	■	■	■	■	■	□
Gas tubes	□	■	□	□	■	□
Inductors	□	□	□	□	■	□
Number of MOVs (metal oxide varistors)	6	10	3	5	3	3
Size of MOVs (mm)	20	20	23	20	20	20
Silicon avalanche diodes	■	□	□	■	■	□
UL Ratings (Pass-through Voltage)						
Hot-to-neutral line	330V	330V	330V	330V	330V	400V
Neutral-to-ground line	330V	330V	500V	330V	330V	400V
Hot-to-ground line	330V	330V	500V	330V	330V	400V
Phone jack	□	□	■	□	□	□
UL 479A-listed phone protection	N/A	N/A	■	N/A	N/A	N/A
General Features						
Power-on light	■	■	■	■	■	■
Separate on/off switches for individual outlets	□	□	□	□	□	□
LED display for surge suppressor activity	■	□	■	■	■	■
Circuit breaker	10 amps	15 amps	15 amps	15 amps	15 amps	15 amps
Warranty						
Length of standard warranty	10 years	5 years	5 years	Lifetime	2 years	2 years
Warranty covers damage to connected equipment	■	□	■	■	□	■
Maximum dollar amount covered	Unlimited	N/A	\$10,000	\$5,000	N/A	Info not available
Miscellaneous						
Technical support hours (Eastern time)	9:00-5:00 M-F	10:30-7:30 M-F	11:30-8:30 M-F	7:00-6:00 M-F	24 hours a day	10:00-8:00 M-F
Sampling of other surge suppressors in company line (with price, number of outlets, UL-listed pass-through voltage on all lines)	Suppress-All AC-4 (\$75, 4, 330V); Suppress-All TAC-4 (\$95, 4, 330V)	1270-04 (\$65, 2, 400V)	Power Tree 20 (\$49.95, 6, 330V); MasterPiece Plus (\$159.95, 5, 330V); MasterPiece Plus Remote (\$169.95, 5, 330V)	TT215 (\$65, 2, 330V); TTM215 (\$87, 2, 330V); TTM425 (\$109, 4, 330V)	Pyramid 213 (\$255, 4, 330V); Pyramid 218 (\$290, 6, 330V)	HP (\$30, 4, 400V)
N/A—Not applicable. The product does not have this feature.						

HARDWARE

Power Protectors

	Panamax Max 6	Pass & Seymour/ Legrand C6-L	Perma Power Electronics RS610	Power Sentry Surge Protector 300 Plus Model 106	Proxima ProLine 30	SL Waber Surge Sentry DL6D	Tripp Lite Isobar 8	Woods Wire Products 5623 Surge Suppressor	Zero Surge ZS1800 Surge Eliminator
	\$99.00	\$133.00	\$93.95	\$15.99	\$99.95	\$139.95	\$114.50	\$34.99	\$199.00

	72	72	72	34	72	72	144	48	72
	Plastic	Plastic	Steel	Plastic	Plastic	Plastic	Metal	Plastic	Steel
	6	6	6	6	6	6	8	6	6
	Two rows	Two rows	Single row	Single row	Single row	Single row	Single row	Single row	Two rows

	■	■	■	■	■	□	■	□	■
	■	■	■	■	□	□	■	■	■
	□	□	□	□	□	□	□	□	□
	□	□	■	□	□	□	□	□	□
	6	6	3	3	6	1	8	7	N/A
	20	20	20	17	18	20	22	14	N/A
	□	□	■	□	□	□	□	□	□

	330V	400V	330V	400V	330V	330V	330V	330V	330V
	330V	400V	330V	400V	330V	330V	330V	330V	N/A
	330V	400V	330V	400V	330V	330V	330V	330V	N/A
	□	□	□	□	■	□	□	■	□
	N/A	N/A	N/A	N/A	■	N/A	N/A	■	N/A

	■	■	■	■	■	■	■	■	■
	□	□	□	□	□	□	□	□	□
	■	■	□	■	■	■	□	■	■
	15 amps	15 amps	15 amps	15 amps	15 amps	15 amps	15 amps	15 amps	15 amps

	Lifetime	Lifetime	Lifetime	2 years	Lifetime	Lifetime	Lifetime	Limited lifetime	10 years
	■	□	■	■	■	■	■	□	■
	Unlimited	N/A	Unlimited	Unlimited	\$25,000	Unlimited	\$10,000	N/A	\$1 million

	10:30-8:00 M-F	8:00-5:30 M-F	10:00-8:00 M-F	9:00-9:00 M-F	11:00-9:00 M-F	8:00-5:00 M-F	8:00-6:30 M-F	10:00-7:00 M-F	9:00-6:00 M-F
	Telemax (\$129, 4, 330V); Lanmax Hub Model (\$149, 4, 330V); Supermax (\$149, 4, 330V)	C4-LCOAX (\$165, 4, 400V); C4-LRS232 (\$165, 4, 400V); C4-LTEL (\$165, 4, 400V)	RT-610 (\$56.95, 6, 400V); RSD-562 (\$202, 6, 330V)	Model #126 (\$9.95, 6, 400V); Model #147 (\$9.95, 1, 400V); Model #149 (\$11.95, 6, 400V)	ProLine 10 (\$49.95, 6, 400V); ProLine 20 (\$69.95, 6, 400V); Power Touch PT-10 (\$79.95, 4, 400V)	DG7SAM (\$44.95, 7, 330V); DS4LP (\$99.95, 4, 330V); DSDLP (\$139.95, 4, 330V)	IsoMaster (\$59.95, 2, 330V); IsoBar 4 (\$79.95, 4, 330V); IsoTel (\$99.95, 4, 330V)	5624 (\$29.99, 6, 330V); 5622 (\$34.99, 6, 330V)	ZS-900 Surge Eliminator (\$149, 6, 330V)

ENDS

voltages—the 330V or 400V that have become common in the industry—have a greater chance of wearing out trying to stop spikes that are not powerful enough to damage equipment. (ZD Labs' testing demonstrated that an unprotected PC power supply can withstand an 800V spike.) Martzloff believes that 500V to 600V pass-through voltages are more reasonable and would vastly increase a MOV's lifespan.

In our research, however, we couldn't find any suppressors that used MOVs rated at 500V or 600V pass-through voltages on the hot-to-neutral line. Your best bet among existing MOV-based surge suppressors is to choose one that prevents more than 500V—comfortably below what our tested PC's power supply can survive—from reaching your equipment. (The features table provides details on the pass-through voltages provided by each product on each line.)

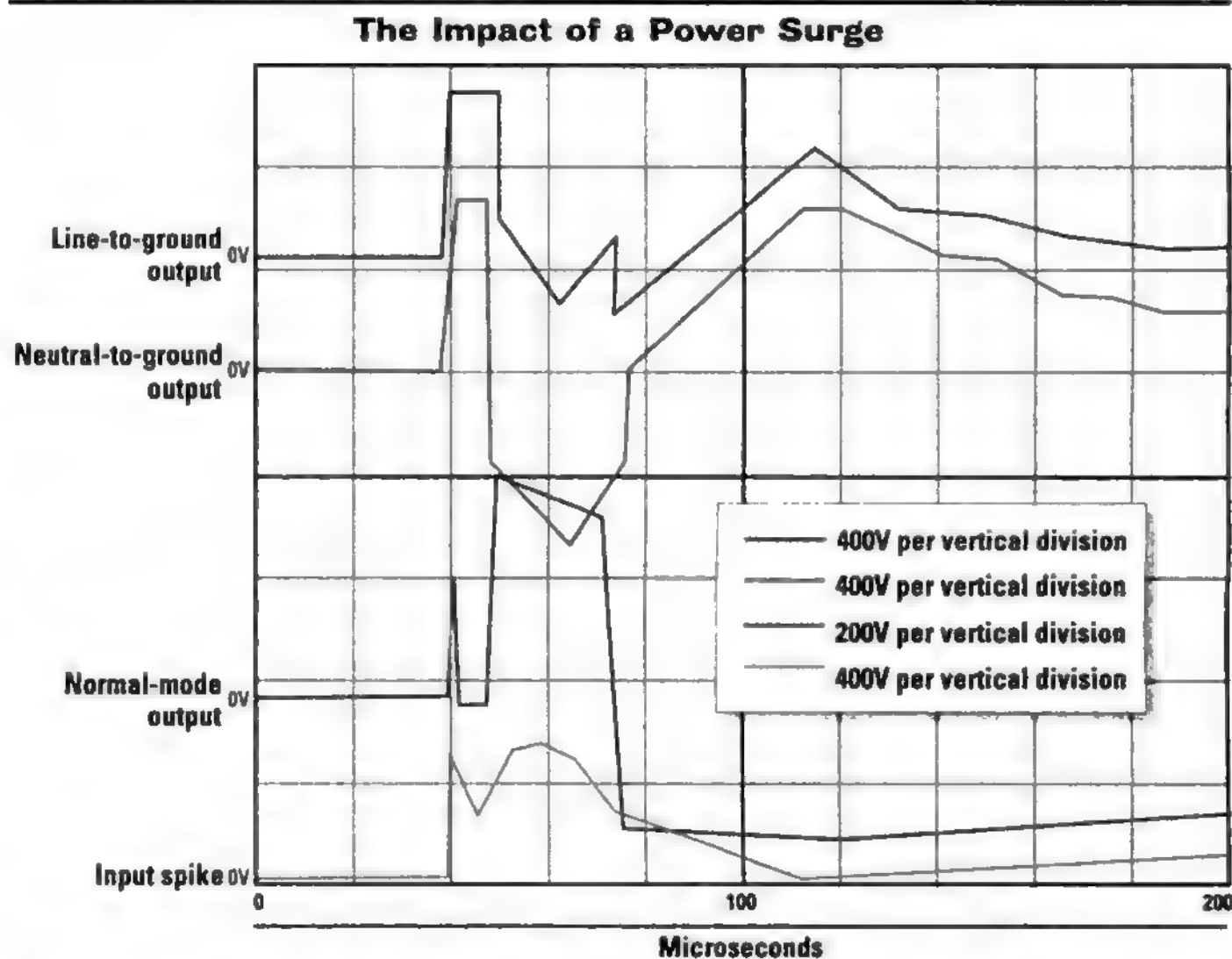
BENCHMARK TEST RESULTS

The best surge suppressor is the one that most consistently protects your equipment from the spikes heading for it. While really nasty electrical jabs hit your equipment far less often than less intense spikes, we wanted to see which devices could withstand a barrage of powerful spikes. ZD Labs' Pass-Through Voltage tests, which feature multiple spikes of three intensities (2,000, 4,000, and 6,000 volts), are more severe than the tests conducted by UL, both in the number of hits applied and in the current each spike carries.

Only four units—the Surge Reactor BN6-6, the Data Shield S100, the Innovative Technology SPIU-6, and the Zero Surge ZS1800 Surge Eliminator—survived these spikes while allowing only 500V or less to pass through them and into the PC.

Of these four units, the Surge Reactor BN6-6 consistently provided the lowest pass-through voltage, with the ZS1800 Surge Eliminator providing the second lowest.

Five contenders let more than 500V through when faced with a 2,000-volt combination wave: the Diagnostic Power Refinery, Inland 3 Mode Surge Protector, Pass & Seymour/Legrand C6-L, PowerTrax 2000, and Power Tree 50. Another 16 units let more than 500V



The top three traces show the oscilloscope output from a surge suppressor being hit by a 6,000V combination wave (bottom trace) applied between line and neutral. Notice that although the spike was applied only between line and neutral, output was affected not only between line and neutral but also between line and ground and between neutral and ground.

through at 4,000 volts, while the units from Power Sentry and Woods Wire Products used audible or visual alarms or both to indicate that surge suppression was no longer active at this level. After the alarms went off, we continued to test, with the result that the units passed excessive voltage through to the test PC. While these surge suppressors behaved appropriately in setting off the alarm that suppression was no longer active, such alerts are valuable only if you're around to see or hear them.

The Electripak 6SSU permitted twice as much voltage to pass through at 4,000V as it did at 2,000V, which strongly indicates that one of the MOVs failed. The unit's alarm light correctly showed there was a problem, though the unit was still able to offer some protection. Closely packed MOVs are a flaw in the Electripak unit's design, a problem it shares with the Power Sentry system. When MOVs fail catastrophically, they can become a short circuit and stay that way unless they have room to split open.

At 6,000 volts, the products from GC Electronics, Pacific Electricord, and Proxima, which had let through less than

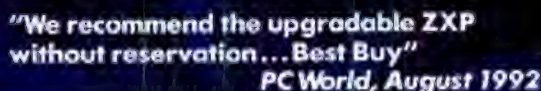
500 volts at intensities of 2,000 and 4,000 volts, no longer made the 500V cut. As they were designed to do, the latter two products' suppression activity indicators turned off at this level. Continued surges after this point produced excessive pass-through voltages, just as they did with the units from Power Sentry and Woods Wire Products.

The scores reported for the Pacific Electricord, Power Sentry, Proxima, and Woods Wire units are the results of a second round of testing. All these products had poor pass-through voltage ratings on our first round of tests. Though they demonstrated significantly better pass-through voltage on the second try (from 100V to 300V lower pass-through voltage), they stopped suppressing surges at the same point both times.

DEGRADATION CONCERNS

The best performance means little if a unit degrades too quickly, and even most manufacturers of MOV-based devices agree that MOVs do degrade over time. MOVs are generally found in 14, 18, 20, and 22 mm sizes; the larger varieties have a greater capacity for energy absorption,

Northgate® ZXP™ Systems With Unlimited 486 Upgradability And Three Cabinet Styles!



"The pride of the system, the ZIF socket, should stand as an example to anybody who wants to manufacture an upgradable system. The Northgate ZXP is our favorite upgradable — by a large margin!"
Computer Shopper, August 1992

Here's Just One Power-Packed ZXP System!

- Intel 80486DX/33 MHz processor
- 4MB of RAM; expands to 32MB
- 200MB hard drive
- 1.2MB and 1.44MB floppy disk drives
- 1024 x 768 color monitor with 1 MB video card
- Space-saving desktop case
- MS-DOS® 5.0
- Microsoft® Windows® 3.1 and mouse
- Award-winning Northgate service and support
- 30-day money back guarantee

Only \$2499
Lease as low as \$85.47/month*

486SX/25\$2199
Lease as low as \$81.36/month*

486DX2/50\$2799

Lease as low as \$95.73/month*

486DX2/66 \$3199
Lease as low as \$109.41/month*

Call for more information!

800-828-6125

Major corporations, volume purchasers and government agencies call National Business Accounts: 800-545-6065
GSA # GS00K91AG55193 P501

Major credit cards, money orders, direct wire, and approved purchase orders accepted.



"When it has to work right"™



Copyright © 2006 by Elsevier B.V. All rights reserved. This journal is registered with the Copyright Clearance Center, Inc., 222 Rosewood Drive, Danvers, MA 01923. Organizations in the USA who are also registered with the Copyright Clearance Center may therefore copy material (beyond the limits permitted by sections 107 and 108 of US copyright law) subject to payment to CCC of the per copy fee of \$12.00. This consent does not extend to multiple copying for promotional or commercial purposes. ISI Tear Sheet Service, 3501 Market Street, Philadelphia, PA 19104, USA, is authorized to supply single copies of separate articles for private use only. Organizations authorized by the Copyright Licensing Agency may also copy material subject to the usual conditions. For all other use, permission should be sought from Elsevier B.V., P.O. Box 17, 3300 AA Dordrecht, The Netherlands. <http://www.elsevier.com/locate/0022-0728>

CODE A4716



Performance Tests: Surge Suppressors

Of the 30 surge suppressors that we tested, only four units—Brooks Electronics' Surge Reactor BN6-6, the Data Shield S100, the Innovative Technology SPIU-6, and the Zero Surge ZS1800 Surge Eliminator—consistently produced pass-through values of 500V or less, which is a little below what a PC's power supply can handle unassisted. Degradation was also an important concern, particularly for the MOV-based units.

PASS-THROUGH VOLTAGE

Pass-through voltage	Surge severity level		
	2,000V	4,000V	6,000V
AESI/StediWatt Diagnostic Power Refinery, Model 718	560	800	620
American Power Conservation Surge Arrest Plus	420	560	420
Brooks Electronics Surge Reactor BN6-6	80	210	140
Brooks Power Systems Surge Stopper BPS-BN6-6	360	560	500
Control Concepts Supertrac ST6D	280	520	520
Current Technology Power Sifter Pro 15	380	560	500
Curtis Manufacturing Ruby Plus	480	780	720
Data Shield S100	460	500	460
EFI Electronics PowerTrax 2000	540	720	660
Electripak 6SSU	500	1,100	800
GC Electronics Power Management System 64-631	368	408	520
Geist Ultimate SRF-6MO/S	420	540	480
General Semiconductor Industries 1206K6	350	540	540
Inland 3 Mode Surge Protector	600	880	680
Innovative Technology SPIU-6	240	280	370
Jayco Electronics Suppress-All AC-6	500	730	540
Joslyn Electronic Systems Model 1203-03 Surge Suppressor	440	740	640
Kensington Microwave Power Tree 50	580	620	720
L.E.A. Dynatech CS-615	410	640	680
NCR Pyramid	440	620	420
Pacific Electriccord XP	400	448	616, 1,416*
Panamax Max 6	460	720	420
Pass & Seymour/Legrand C6-L	520	780	500
Parma Power RS610	340	1,000	900
Power Sentry Surge Protector 300 Plus Model 106	392	456; 1,040*	N/A
Proxima ProLine 30	376	496	480; 1,470*
SL Weber Surge Sentry DL6D	440	560	520
Tripp Lite Isobar 8	440	660	500
Woods Wire Products 5623 Surge Suppressor	408	578; 1,088*	N/A
Zero Surge ZS1800 Surge Eliminator	230	270	340

Lower scores represent increased surge suppression capability

DEGRADATION

Pass-through voltage	Surge severity level	
	2,000V	4,000V
AESI/StediWatt Diagnostic Power Refinery, Model 718	480	580
American Power Conservation Surge Arrest Plus	320	380
Brooks Electronics Surge Reactor BN6-6	110	140
Brooks Power Systems Surge Stopper BPS-BN6-6	300	380
Control Concepts Supertrac ST6D	400	520
Current Technology Power Sifter Pro 15	400	500
Curtis Manufacturing Ruby Plus	540	680
Data Shield S100	440	520
EFI Electronics PowerTrax 2000	420	620
Electripak 6SSU	800	900
GC Electronics Power Management System 64-631	392	464
Geist Ultimate SRF-6MO/S	420	480
General Semiconductor Industries 1206K6	400	480
Inland 3 Mode Surge Protector	620	580
Innovative Technology SPIU-6	300	360
Jayco Electronics Suppress-All AC-6	420	500
Joslyn Electronic Systems Model 1203-03 Surge Suppressor	480	640
Kensington Microwave Power Tree 50	500	640
L.E.A. Dynatech CS-615	440	580
NCR Pyramid	380	360
Pacific Electriccord XP	N/A	N/A
Panamax Max 6	420	480
Pass & Seymour/Legrand C6-L	440	460
Parma Power RS610	N/A	950
Power Sentry Surge Protector 300 Plus Model 106	N/A	N/A
Proxima ProLine 30	N/A	N/A
SL Weber Surge Sentry DL6D	440	460
Tripp Lite Isobar 8	380	460
Woods Wire Products 5623 Surge Suppressor	N/A	N/A
Zero Surge ZS1800 Surge Eliminator	240	280

A difference of 100V or more between the two scores indicates degradation

which, in theory, should contribute to durability. Most of the units in this review use 20- and 22-mm MOVs, including the two best MOV-based performers: the Surge Reactor BN6-6 (20-mm MOVs) and the Data Shield S100 (22-mm).

In general, however, MOV longevity depends mostly on environment: how often spikes hit and how powerful the spikes are. Don't believe claimed MOV life spans of 100 years, but don't worry about the MOVs dying in a week, either.

As a MOV degrades, it acts on less and less significant spikes; for instance, a

MOV with a pass-through voltage rating of 330V on all three lines may start to clamp at 300V instead. Eventually, the MOV may clamp almost continuously. This can cause it to overheat rapidly and split, leaving the surge suppressor unable to protect that set of lines.

You might think that a more expensive MOV-based unit would be less prone to degradation, but that's not necessarily true. The most expensive system in this roundup—the \$399 unit from Current Technology—showed degradation over our testing period, while the more rea-

sonably priced \$105 Data Shield S100 showed less significant degradation. The S100 also may have benefited from the inclusion of a gas tube as an additional suppression element. Gas tubes can handle great amounts of energy—much more than MOVs—and could prove a help in preventing degradation of MOVs.

The MOV-free design of the Zero Surge product avoids the problem of suppression degradation altogether (unless you count the fact that electrolytic capacitors dry up after about ten years). In fact, it shared with the Data Shield S100, the

HOW WE TESTED

For these tests, ZD Labs placed each surge suppressor in a fireproof enclosure and then plugged the suppressor into the single phase adapter of a Haefely FP 20/3-3 Coupling Filter. A PC power supply and two 60-W lamps were plugged into each surge suppressor to simulate a computer, monitor, and printer. Using a Haefely PC6-288 Impulse Generator and the Coupling Filter, we injected a fast transient surge onto the power line and hence through the surge suppressor. A Tektronix TDS 540 Digital Oscilloscope measured the surge as it went into the suppressor and as it came out of the suppressor. Probes attached between line and ground and between neutral and ground measured the voltage between lines when the surge was applied.

The occurrence rate of surges varies over wide limits, depending on the particular power system and its location. We designed our tests to represent how the surge suppressor would behave in a typical home or office setting (while ensuring that the tests would be repeatable). As a basis for designing the wave forms that would be used to represent the environment, we used IEEE's publication "IEEE Recommended Practice on Surge Voltages in Low-Power AC Power Circuits" (IEEE C62.41-1991). We primarily used the combination wave, which represents a surge caused by lightning hitting a power line. The other wave form we used was the 100-kHz ring wave, which represents a surge caused by switching transients.

We started with a set of relatively easy surges, which all the surge suppressors were expected to pass, and then increased the severity of the surges, for a total of three levels on the Pass-Through Voltage test and two levels on the Degradation test. (We continued testing products for pass-through voltage and degradation even after alarms indicating that surge suppression was no longer active had gone off.)

The first set of surges represents areas with low exposure to lightning and includes 13 combination wave surges at a 2-kV (2,000-volt) severity (three at 0 degrees phase, four at 90 degrees phase, four at 165 degrees

phase, and two at 270 degrees phase).

The second level represents areas with medium exposure to lightning and includes the first-level test plus eight combination wave surges at a 4-kV (4,000 volt) severity (two at 0 degrees phase, two at 90 degrees phase, two at 165 degrees phase, and two at 270 degrees phase).

The third level represents areas with the highest exposure to lightning. It includes the second level test plus four combination wave surges at a 6-kV (6,000 volt) severity (one at 0 degrees phase, one at 90 degrees phase, one at 165 degrees phase, and one at 270 degrees phase), two 100-kHz ring-wave surges at 6kV severity (one at 0 degrees phase, one at 90 degrees phase), one combination wave surge at 4 kV severity at 0 degrees phase, and one combination wave surge at 2 kV severity at 0 degrees phase.

On the tests, products with pass-through voltages of 500V or below performed best. Products with pass-through voltages over 500V but less than 800V performed adequately.

The **Pass-through Voltage** test measures the peak voltage that passes through the surge suppressor as a result of a surge injected onto the power line. We measured the pass-through voltage for each surge suppressor at surge severity levels of 2,000V, 4,000V, and 6,000V. The smaller the pass-through voltage, the better the product's capability to suppress a given surge.

The **Degradation** test measures the wear that each suppressor experiences during our tests. This test is a long-term performance indicator and is the last test performed. It is measured at severity levels of 2,000V and 4,000V. Degradation manifests itself as a large increase or decrease in pass-through voltage.

N/A—Not applicable. This unit suffered a complete failure of the suppression circuitry.

*The first number indicates the pass-through voltage level at the time of the alarm; the second number indicates the pass-through voltage after the alarm went off.

Surge Reactor BN6-6, and the Innovative Technology SPIU-6 the distinction of being the only units to allow less than 500 volts through on all our Pass-Through Voltage tests *and* to show no significant degradation on our Degradation tests.

One ignominious example of a failure during our testing comes from the performance of the Perma Power RS610. Its LED display indicated that the unit was still working during the 2,000V Degradation test even after it had let through a damaging spike on the Pass-Through Voltage tests. Perma Power confirmed

that the unit will always fail after sustaining the amount of energy that ZD Labs' tests subjected it to.

Although the Inland 3 Mode Surge Protector completed our Pass-Through and Degradation tests, it exhibited burn marks on the inside of its case. The design of the Innovative Technology SPIU-6 was also problematic: The unit was filled with an epoxy resin that completely surrounded its components (the company would reveal only that MOVs were included in the design). Because of the unit's construction, its ability to dissipate

heat is uncertain, though there were no problems during testing.

SUPPRESSING WITHOUT MOVs

The innovative Zero Surge ZS1800 Surge Eliminator may suffer from some flaws that don't afflict the more traditional MOV-based units. When the giant coil in the ZS1800 Surge Eliminator confronts a spike, it absorbs some of the energy and passes a small part of it through. But some of the spike rebounds down the wire, which can be a problem if the unit is at the end of a long circuit in the building wiring. The rebounding energy can cause trouble for every machine it passes back through.

The main drawback of the Zero Surge unit, however, may revolve around the issue of common-mode disturbances. *Normal mode* describes power anomalies that occur on the hot line with respect to neutral. *Common-mode* disturbances are anomalies between either conductor (hot or neutral) and ground and can result from an electrical device being switched off indoors. (Common-mode disruptions that originate outside a building are screened out by the bonding of the neutral and ground lines at the building's service entrance, in accordance with the National Electric Code.) The IEEE states that common-mode spikes occur more often than normal-mode problems.

The MOV-based devices we review here have protection on all three lines, diverting common-mode disturbances onto the ground line just as they do normal-mode disturbances. Since the Zero Surge device lacks connections with the ground line, it cannot block common-mode problems.

The ZS1800 Surge Eliminator doesn't protect against common-mode surges because the company doesn't consider them a problem—it believes there isn't enough energy behind them to do the damage that normal-mode disturbances can do. According to Martzloff, however, although common-mode disturbances are generally less severe than normal-mode spikes, there is at least the *possibility* that they can be severe enough to damage your system.

THE NETWORK DILEMMA

Some network wiring systems build in a degree of immunity to transient voltages.

LANTASTIC™ 4.1 Drivers
Available Now!!

ROAR!

**FINALLY! A LAN ADAPTER THAT GETS
THE NETWORK OFF YOUR DESK.**



Older Generation Adapter



New Kodiak NotePort™ Connector

Kodiak's new NotePort™ is a breakthrough in LAN integration. It ports your notebook or laptop to the Ethernet LAN—but doesn't tie you to a jungle of desktop cables, adapters, or transformers. The only thing that's on your desk is NotePort's tiny parallel port connector. And it's so small and lightweight it lets you attach to the network in a flash. NotePort supports both 10Base-T and coax cabling in one unit and comes standard with a parallel

port pass-through for easy access to local printers. Its pre-built NetWare™ drivers make installation one-step easy and its unique integrated power supply eliminates bulky brick transformers. For order information, contact the distributors listed below.

- **List Price is only \$399**
- **5 Year Warranty**
- **Toll-free Technical Support**
- **24 Hour Replacement Policy**
- **Made in USA**



Kodiak
T E C H N O L O G Y



1-800-83-MICRO



1-800-237-8931



**CompuCom
Systems**

703-761-2340

Power Protectors

Fiber optic cabling, for example, conducts only light, so electrical anomalies pose no threat. The IEEE specification ensures that 10BaseT systems remain immune to power problems.

Other wiring schemes are not so well protected. Thin Ethernet will competently handle all but the largest transients unless you use AUI cable, which provides no protection. Token-Ring systems often include some form of power protection, but the level depends on the manufacturer of the Token-Ring equipment. RS-232 connections have almost no immunity to power problems.

Equipment plugged into separate outlets and connected with communications lines faces a threat not encountered by standalone devices. This threat results from *ground skew*—a condition in which points along a building's safety ground develop different electrical potentials.

Computer equipment uses ground as a voltage reference for internal circuitry, so if ground potential rises, so do all voltages within the machine. Ground voltage sometimes rises at one machine on a network, but not at another plugged into a different outlet. This ground skew can create a significant difference in potential from one end of the data line to the other. As a result, a powerful current may travel through the data line, damaging equipment at the lower voltage end.

Ground skew can come from a lightning hit outside a building or from surge suppressors or other electrical equipment dumping part of a spike's energy to ground. Zero Surge says that its device can't add to the problem, since the ZS1800 makes no direct connection to ground (although that doesn't rule out the problem occurring through induction). At any rate, neither the Zero Surge unit nor MOV-based devices prevent ground skew itself from happening.

Surge suppressors with the appropriate connections (network or phone) can, however, help prevent the harmful effects that can result from ground skew, because they block the spike on the data line before it hits the equipment.

Although the scope of this review does not extend to products that offer network connections, some companies do sell network versions of surge suppressors. EFI Electronics makes the \$49.95 EFI Electronics M-TP3C for Twisted-

The world's best printer sharing value. PrintDirector.

PC Magazine has called PrintDirector a "device we can unreservedly recommend to direct the printer sharing needs of almost any user."

And for good reason. PrintDirector offers world-class peripheral sharing products for every budget and work group. Including PrintDirector Bronze, the most affordable printer sharing device. And PrintDirector Gold Turbo, the world's fastest. (Plus PrintDirector Silver, the world's next fastest.) Test results prove it.

NATIONAL SOFTWARE TESTING LABORATORIES' SPEED TEST RESULTS*							
Harvard Graphics Output File (Seconds to Print)	PrintDirector Gold Turbo	PrintDirector Silver	Novell Lite	ASP	ESI	Buffalo	Lantastic
	42.8	59.6	203.9	103.1	84.9	84.6	71.1

PrintDirector Gold Turbo printed nearly five times faster than Novell Lite, almost 2 1/2 times faster than ASP Port Authority, about twice as fast as ESI Share Spool and Buffalo SLMkil, and 40% faster than Lantastic. *Based on printing an output file created with Harvard Graphics. Total time for three PCs to print concurrently to two printers.

ANATOMY OF A GREAT DEAL

PrintDirector has won more times than any other device.



Comes with the industry's best support — and it's **FREE!**

Easiest device to install, according to NSTL.



Prices start at \$395 for PrintDirector Bronze.

30-day unlimited money-back guarantee.

Reliably used by over one million users worldwide.



Saves you more time when printing.

To find out more about the world's best printer sharing value, call and we'll send you a free NSTL report and our catalog.

1-800-243-2333

or 617-647-1234

FREE

Printer Sharing Device Performance

An NSTL Report



DIGITAL PRODUCTS, INC.

the leader in networked printing and peripheral sharing

411 Waverley Oaks Road, Waltham, MA 02154

PrintDirector is a registered trademark of Digital Products, Inc. All other trademarks mentioned are property of their respective holders.

Introducing a New Breed of Programming Book



ISBN: 1-56276-059-9 Price: \$29.95
ISBN: 1-56276-063-7 Price: \$29.95

Ziff-Davis Press proudly introduces the Lab Notes series by presenting two new titles: *PC Magazine Assembly Language Lab Notes* and *PC Magazine C Lab Notes*.

These specially designed book/disk packages give programmers a unique opportunity to learn the programming secrets of acknowledged masters. Bolster your skills and solve both common and uncommon problems as you join the authors in systematically creating a fully functional utility in every chapter.

What's more, because each sample program is included on the bound-in companion disk, you can concentrate on nuts-and-bolts programming instead of keying in lines of code.

Join the masters at work and achieve new heights of programming power and elegance with the Lab Notes series from Ziff-Davis Press.

In the future, look for books on BASIC and DOS Batch Files.

Available at fine bookstores, or call

1-800-688-0448
ext. 8410



© 1992 Ziff-Davis Press

HARDWARE

Power Protectors



Brooks Electronics' Surge Reactor BN6-6

These three products performed well on our tests, providing consistent pass-through values of 500V or less. The BN6-6 and S100 use MOVs as part of their design, while the ZS1800 is based on a coil and two electrolytic capacitors.

pair to Token-Ring connections, and Panamax offers its Lanmax series of devices for Ethernet and ARCnet connections, which cost from \$149 to \$159.

Some of the products in this review do feature phone line protection—the Surge Arrest Plus, Supertrac ST6D, Power Sifter Pro 15, Ruby Plus, and ProLine 30—but only the ST6D, Power Sifter Pro 15, Ruby Plus, and Woods 5623 Surge Suppressor use MOVs to protect the phone line. The other products use only fuses, a less effective technique.

TOTAL PROTECTION

No plug-in surge suppressor by itself can handle all power anomalies. To include protection against the largest external spikes, your building should have a surge arrestor, basically a large surge suppressor, at the service entrance. A good surge suppressor will, however, provide you with the protection you need to keep most spikes from causing damage.

In making your choice, don't be swayed by features such as lifetime warranties (no matter how generous, they can't replace your data) or unnecessary extras like superfast response times and EMI/RFI noise filtration.

Claims about the superiority of low

pass-through voltages may also seem more attractive than they really are. Surge suppressor vendors need to reconsider the practice of using MOVs with lower pass-through voltages.

Among the current options, MOV-based devices with protection on each line still rank as the optimum choice for keeping spikes from damaging your equipment. Only seven of the 29 MOV-based devices in this review allowed more than 800V—enough voltage to damage a PC's power supply—to get through them and into our simulated PC on our tests. And of those, four units at least provided some warning that surge suppression was no longer active before letting the excessive voltage through.

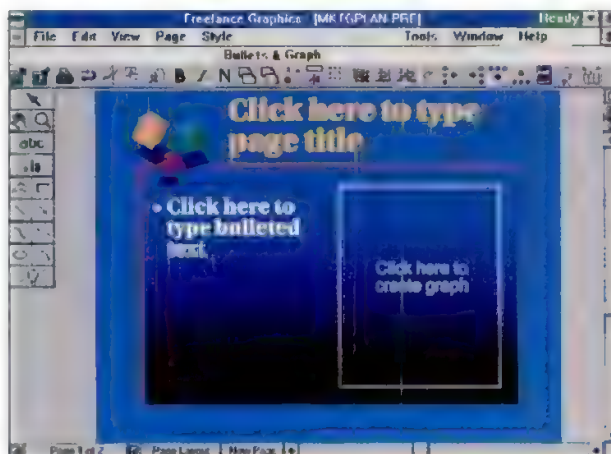
While the Zero Surge system gets credit for an innovative design and good performance on our tests, its inability to protect against common-mode surges and the damage they can cause is worth keeping in mind. When it comes to protecting your data against power anomalies, it's better to be safe than sorry. □

GARY BERLINE IS A FREQUENT CONTRIBUTOR TO PC MAGAZINE. ANGELA GUNN AND CATHERINE KUNKEMUELLER ARE STAFF EDITORS OF PC MAGAZINE.

The trouble with Harvard is you need too much education to get into it.



Harvard Graphics for Windows



Freelance Graphics for Windows

Suppose you had to create a presentation for a meeting tomorrow. Why choose Freelance Graphics?

Well, Byte Magazine (2/92) "put together a moderately complex real world presentation within half an hour of installing the package."



PC Magazine (3/17/92) called Freelance Graphics™ for Windows™ "simply the best on the market."

And in an independent comparison*, users unanimously rated Freelance easier to use than Harvard Graphics® (try getting consensus on anything in business!)

Maybe it's because of SmartMasters™, our unique "fill-in-the-blank" process. Maybe it's because of

QuickStart, our on-screen tutorial. Whatever the reason, now you can decide for yourself.

Just call** 1-800-TRADE-UP, ext. 6930, and upgrade to Freelance from any graphics package.



Pay just \$129. Try it risk-free for 60 days. If you're not 100% satisfied, return it for a full refund. We'll even give you a SmartPics™ Clip Art Sampler absolutely FREE—a \$29.95 value.

So try Freelance for yourself. And see how you can go from the package to the podium with almost no education.

Lotus Freelance Graphics for Windows

In Canada, call 1-800-60-LOTUS.

* Usability Sciences Corporation. Freelance Graphics for Windows vs. Harvard Graphics for Windows, January 1992.

** Please have your credit card and product package ready when you call. Offer expires 8/31/92.

© 1992 Lotus Development Corporation. All rights reserved. Lotus is a registered trademark and Freelance Graphics, SmartMasters, and SmartPics are trademarks of Lotus Development Corporation. Windows is a trademark of Microsoft Corporation. Harvard Graphics is a registered trademark of Software Publishing Corporation.

WINDOWS 3.1
COMPATIBLE

THE BEST DOS JUST GOT BETTER

When you want the best DOS for NetWare®, there's really only one choice: the DR DOS® LANPack, version 6.0.

It's the only DOS you can install and configure on client PCs directly from the server – saving time, giving you centralized control, and eliminating the support hassle of having different versions of DOS on your networked PCs.

It makes end-user support easier by using upper and high memory better than the competition – providing more room to run large applications, even on 8086/8088 and 286 PCs.



Its dynamic file compression feature lets you store up to twice as much information on a local hard disk.

With the NetWare-DR DOS combination, you only need to dial one customer support number to get the service you need – fast.

And the DR DOS LANPack is sold just like NetWare – packaged for 5, 10, 20, 50, 100, or 250 users, complete with dual media and documentation.

Let us fax you the facts: 1-800-955-DOS6.

Novell's DR DOS LANPack.
The DOS of choice for NetWare. The only DOS with remote install and configuration.

Request document 719. Or call us for details and the name of the DR DOS LANPack reseller nearest you: 1-800-274-4374.

D R D O S L A N P A C K

DR DOS is a registered trademark of Digital Research, Inc. Novell, the Novell logo, and NetWare are registered trademarks, and LANPack is a trademark of Novell Inc. Other product names are trademarks or registered trademarks of their respective owners. Copyright © 1992, Novell Inc.

 **NOVELL**

Programming

UTILITIES

Keep Indispensable Applications Handy with TOTOP

BY JOHN DEURBROUCK

If screen space is one of your scarcest system resources, you probably run your most frequently used Windows applications in full-screen mode. This lets you see more of what you're working on, but by hiding everything else, it costs you one of the major advantages of the Microsoft Windows environment.

TOTOP is a small (less than 9K) Windows 3.1 utility that lets you cheat a bit. With TOTOP, you can "float" an application, or even an icon, above your currently active full-screen program. Just click on the TOTOP icon and select Top or Bottom and you can float or sink any window with a click of the mouse—without deactivating the program window in which you're working. Since TOTOP uses features that are new in Windows 3.1, it can't be used with older Windows versions. It also requires a mouse.

You can download TOTOP.EXE from PC MagNet by following the instructions in the sidebar "Utilities by Modem." The C source code for TOTOP is downloadable as part of TOTOP.ZIP, which also contains the .RC, .DEF, .ICO, and .CUR files necessary to build TOTOP.EXE. TOTOP was compiled for distribution with the Windows 3.1 SDK and Microsoft's Quick C, Version 1.0. The source can also be compiled, however, with Borland C++, Version 3.0; Turbo C++ for Windows, Version 1.0; or Microsoft C, Version 7.0. For further details, see the sidebar "How to Compile TOTOP."

If you don't have a modem, you can get a copy of the executable and its source code by mailing a postcard with your name, address, and preferred disk size to the attention of Katherine West, Utilities, *PC Magazine*, One Park Avenue,

New York, NY 10016. No phone calls please.

USING TOTOP To take a quick look at TOTOP, simply pull down the File menu in the Program Manager, select Run, and execute TOTOP.EXE from the command line. Subsequently, you'll probably want to add TOTOP to the Program Manager with File New, or even put it in your Startup group.

TOTOP makes no entries in WIN.INI or in any of your other files. Thus, if you

*Now you can float an
application or icon on top of
a full-screen application
and keep the full-screen
program active at the same
time.*

later decide to remove the utility from your system, you have only to delete any references to TOTOP in the Program Manager and delete the executable file TOTOP.EXE. Note, however, that you can't delete TOTOP.EXE while it's running, thanks to the protection Windows gives to executing programs.

When you run it, TOTOP appears

only as an icon. You activate it by clicking once on the icon and then choosing an option from the system menu that pops up. Help gives a very abbreviated description of TOTOP, with quick-reminder directions for its use. The About choice provides the current TOTOP version number and displays TOTOP's copyright statement. Close deactivates the utility. The Top and Bottom choices do TOTOP's real work.

When you select TOTOP's Top menu option, the mouse cursor changes to the form shown in Figure 1a. Whenever you move the mouse, TOTOP examines the window at which the cursor is pointing. If the mouse is pointing at the desktop or at a window that's already in the top-most layer, TOTOP changes its Top cursor to the No Top version shown in Figure 1b. The No Top cursor signifies that these windows cannot be floated.

Clicking the mouse when the Top cursor is displayed makes the application at which you are pointing float above the others. If you click when the No Top cursor is shown, TOTOP will simply release the cursor. Note in Figure 2 how the Notepad window remains visible over the full-screen Windows Write session even during menu interaction with the larger window.

TOTOP's Bottom menu option allows you to take any window out of the floating position, returning it to wherever it came from. When you select Bottom, the cursor takes the form shown in Figure 1c if you are pointing at the top-layer window. When you point at the desktop or a nontopmost window, the cursor changes to the No Bottom version shown in Figure 1d.

The best way to get a feel for how TOTOP affects your display is simply to ex-

► IN THIS SECTION:

Lab Notes 379
Environments 395
Power Programming 399
Databases 405
Languages 407

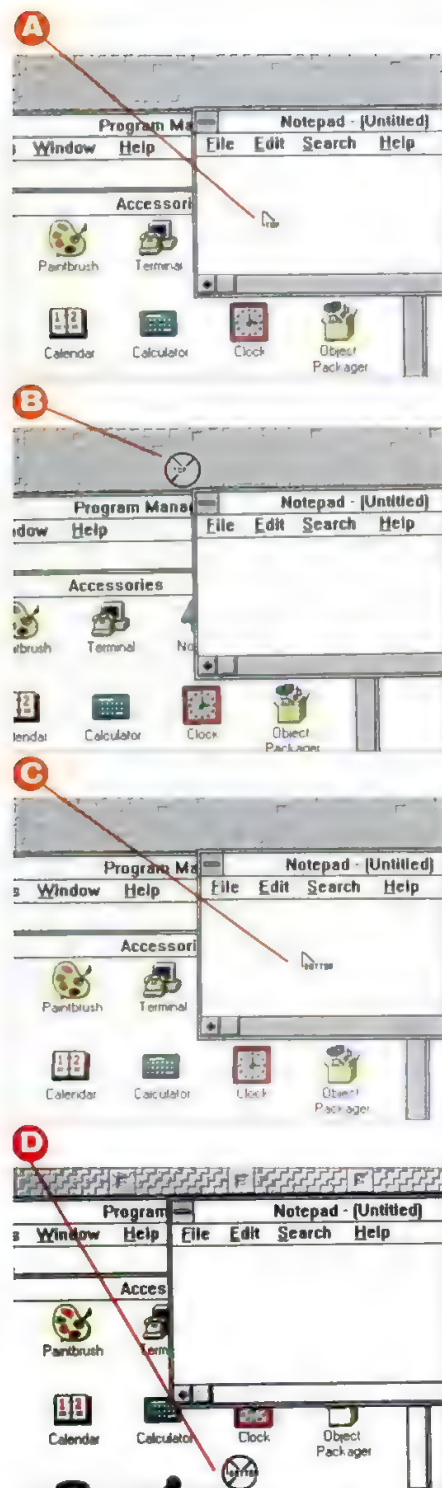


Figure 1: When you select TOTOPTOP's Top option, the pointer assumes the shape shown in *a* when on a window that can be floated above your application, and it assumes the shape in *b* when on one that cannot be floated. Similarly, the Bottom option produces the cursor shown in *c* when positioned on a floating window that can be restored, and the shape shown in *d* when pointing at a window that TOTOPTOP cannot sink further.

periment with it. You might decide to keep the Clock or Notepad floating above your active program as a matter of course. Obviously, however, if you float too many little windows, they may obscure your full-screen application so much that they become more annoying than helpful.

One warning is in order. Depending on the layout, a window you have floated may lie directly above the area where your application needs to bring up a dialog box. In such a case, if you try to bring up the dialog box, your efforts to interact with the application will only generate error beeps; the program requires a response to its covered-over dialog box. The solution is to minimize or sink the obscuring window.

TOTOPTOP'S DESIGN As soon as I started using Windows 3.1, I was so attracted by WinHelp's Always on Top option that I wanted to extend that capability to other windows as well. I soon realized that because all Windows programs use Windows' services to display themselves, it would not be difficult to use Windows itself to float any application.

I considered giving TOTOPTOP a hotkey or designing it to inject an Always on Top option into each application's system menu. However, there were several advantages to keeping TOTOPTOP unobtrusive and its design simple.

First, TOTOPTOP does not use any undocumented features, so it's likely to work with future versions of Windows. Second, TOTOPTOP does not impose a big drain on your system; at less than 9K, it's probably one of your smallest Windows utilities. And since it is completely dormant when not in use (it has no system hooks), it doesn't lower the performance of your applications. Finally, if you need to remove the utility—which is unlikely—it's easy to do. Erase TOTOPTOP.EXE, and TOTOPTOP is gone. There are no configuration files or entries in WIN.INI to delete.

INSIDE TOTOPTOP Since the C code for TOTOPTOP is relatively short, I'm going to take advantage of this opportunity to go through the code for the main procedures step by step.

The first procedure is WinMain(). WinMain() makes sure the facilities that TOTOPTOP needs to run are present. The first thing WinMain() checks is that no copy of TOTOPTOP is already running.

There would be no functional advantages to running multiple copies. The test involves simply checking the previous instance handle provided as a parameter to WinMain().

Next, WinMain() checks that TOTOPTOP is operating under Windows 3.1 or later. It produces a UAE when run under Windows 3.0. WinMain() also tests for the presence of a pointing device by using

```
GetSystemMetrics(SM_MOUSEPRESENT)
```

The SetCapture() function, used when the user clicks on the window to be floated, will lock up the user's system if no mouse is present.

The next step is to register the TOTOPTOP class, with which TOTOPTOP.ICO and WndProc() are associated. Then it's time to create and display the TOTOPTOP icon by creating and showing a window. Note that TOTOPTOP uses CreateWindowEx() instead of CreateWindow, so that it can use the Extended window WS_EX_TOPMOST.

Since TOTOPTOP runs as an icon, it should align itself with the other Windows icons. Using the default position values in the call to CreateWindowEx() takes care of that.

The next step uses AppendMenu() to add options to the system menu. There's no reason TOTOPTOP couldn't become a full-size application window, but there's no point in making it one, either. With so few actions to perform, and with user interaction limited to applying TOTOPTOP to other applications, I decided to keep TOTOPTOP iconic and let the user interact with TOTOPTOP via the system menu.

All that's left to do at this point is to display the window and start the message loop. The rest of WinMain() consists of cleanup code to be used when TOTOPTOP shuts down.

TOTOPTOP'S WINDOW PROCEDURE Like most Windows programs, TOTOPTOP uses WndProc() to process its messages. These are of several kinds. Most Windows programs get menu commands via WM_COMMAND messages, which are generated by interaction with standard menus. When, as in the case of TOTOPTOP, a Windows program gets messages from the system menu, menu selections from the user come as WM_SYSCOMMAND messages instead.

It's important to remember that the least significant four bits are undefined; that's the reason for the construct (`wParam&0xFFF0`). Don't forget this when choosing command values for your own menu items; if `IDM_TOP` were `0xE010` and `IDM_BOTTOM` were `0xE011`, you would not be able to distinguish them.

TOTOP also intercepts `SC_MAXIMIZE`, `SC_RESTORE`, and `SC_SIZE` messages. If it didn't, the user could maximize TOTOP, making it a full-size window. Since this window doesn't even have a menu, you must prevent the user from restoring or maximizing it. For the same reason, TOTOP intercepts `WM_SIZE` messages and eats `SIZE_MAXIMIZED` and `SIZE_RESTORED` messages.

TOTOP does process some of the mouse messages when Top or Bottom actions are being performed. These will be discussed more in detail below. The program responds to a `WM_CLOSE` message by destroying the main window and calling `PostQuitMessage()`. Finally, TOTOP calls `DefWindowProc()` either to process or to squelch all the messages it doesn't handle itself.

TOTOP'S OPTIONS The Help and About options are handled very simply by using the `MessageBox()` function to show a limited amount of information. With Mes-

sageBox() calls, you don't have to provide dialog procedures, so they're much easier to use than dialog boxes. Although not as attractive as dialog boxes, they reduce code size and complexity.

The Close command will send a `WM_SYSCOMMAND` message with a `wParam` of `SC_CLOSE`. Since `DefWindowProc()` does just what is wanted, it is allowed to pass through untouched.

Floating or sinking the window selected by the user involves several steps. First, as soon as TOTOP gets the `WM_SYSCOMMAND` message of `IDM_TOP` or `IDM_BOTTOM`, it calls `DoTopBottomAction()`.

`DoTopBottomAction()` loads the two appropriate cursors and then captures the mouse with `SetCapture()`. This allows the user to move the mouse cursor all over the screen, with all the mouse messages being sent to `WndProc()`. The variable `nDoingTopBottomAction` has two uses. First, when TOTOP is not active, it is 0, which means that mouse messages should be passed through to `DefWindowProc()`. Second, its value, when non-zero, is either `DO_TOP` or `DO_BOTTOM`, which will be used in

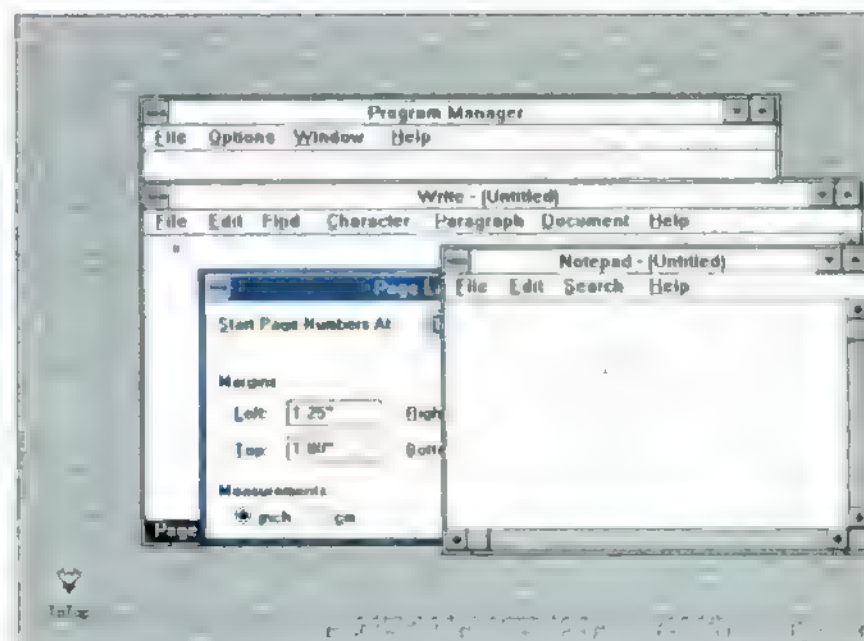


Figure 2: A window floated by TOTOP (here, Notepad over Windows Write) remains floating even when the underlying active application calls up a dialog box.

both `IsDoable()` and `TopBottomWindowAtPoint()`.

`DoTopBottomAction()` also saves the handle to the original cursor in `hcOldCursor`. This enables redisplay of that cursor when TOTOP becomes inactive. Since TOTOP may or may not be successful in loading the appropriate cursors from its resources, `nDestroyOkCursor` and `nDestroyNotOkCursor` are used to determine whether it will be necessary later to call `DestroyCursor()` for each cursor. Of course, you don't expect that in the normal course of events TOTOP will ever fail to load its cursors. But since calling functions like `SetCursor()` with in-

■ Utilities by Modem

The *PC Magazine* utilities are available by modem from PC MagNet, a ZiffNet service hosted by CompuServe.

To find the telephone number nearest you, set your communications software to 300, 1,200, 2,400, or 9,600 bits per second, 7 data bits, even parity, 1 stop bit, and full duplex, then dial 800-346-3247 with your modem. When the modem connects, press Enter. At the HOST NAME prompt, enter PHONES. Follow the menus and note the number closest to you. Alternatively, you can call 800-635-6225 (voice) and follow the instructions and note the number.

To obtain the current issue's utility free of charges, dial your local number; at the HOST NAME prompt, type

CIS; at the USER ID prompt, enter 60116,1. At the PASSWORD prompt, enter PCMAGUTIL.

To join ZiffNet: At the USER ID prompt, type 177000,5000. Then, at the PASSWORD prompt, enter PC*MAGNET. Finally, at the ENTER AGREEMENT NUMBER prompt, type PCMAG92.

Register your name and enter your MasterCard, Visa, or American Express card number. (If you'd like to have your company billed instead, call CompuServe at 800-848-8990.) Your personal user ID and a temporary password will be displayed. A new password will arrive in the mail within ten days to confirm your subscription.

ZiffNet membership costs \$2.50 per

month. This includes access to *PC Magazine* Editors' Choice Awards, Product Reviews Index, Weekly News from *PC Week*, Buyers' Market, ZiffNet Highlights, and the Support Forum (which also includes the current utility). CompuServe members can join by entering GO PCMAG at any CompuServe ! prompt.

Outside of these areas, PC MagNet costs \$6.30 per hour for 300-bps service, \$12.80 for 1,200 or 2,400 bps, and \$22.80 for 9,600 bps. Billing is based on 1-minute increments.

These programs can be copied but are copyrighted. You may make copies for others as long as no charge is involved, but making copies for any commercial purpose is prohibited. □

■ How To Compile TOTOP

TOTOP is specific to Windows 3.1. Since topmost windows are new in this version, the 3.0 WINDOWS.H does not support the constants used to handle them. Therefore, you'll need at least a 3.1 WINDOWS.H file. Since all the functions called in TOTOP existed in Version 3.0, however, you can still use 3.0 import libraries.

You may be able to compile TOTOP by using a WINDOWS.H designed for Windows 3.0 if you #define the new constants. Here are illustrative definitions:

```
#define HWND_TOPMOST      ((HWND)-1)
#define HWND_NOTOPMOST    ((HWND)-2)
#define WS_EX_TOPMOST      0x0000008L
```

Although Windows 3.1's WINDOWS.H file allows you to produce Windows 3.0 programs by conditionally excluding the definition of some identifiers (using #define WINVER), it does not block the definition of either HWND_TOPMOST or HWND_NOTOPMOST. However, since I got UAs regularly when I called SetWindowPos() with HWND_TOPMOST or HWND_NOTOPMOST, using these identifiers with Windows 3.0 is probably not a good idea.

TOTOP was designed, implemented, and tested using Quick C for Windows 1.0, together with the Microsoft C/C++ 7.0 libraries and header files. I was also successful in creating TOTOP with Borland C++ 3.0 after I switched to the version of WINDOWS.H that comes with the 3.1 SDK. Still, I did have to use the version of the resource compiler that came with the Borland product. The resource compiler that came with the SDK didn't work with the Borland compiler, but Borland's RC.EXE produced a TOTOP.EXE that worked fine.

Porting TOTOP to other C compilers that support Windows 3.1 should be very easy. There are no undocumented calls, and no use of Microsoft-specific C library functions or language features.

The steps for compiling TOTOP

with several compilers follow.

If you are using Quick C for Windows:

- Start Quick C for Windows and ensure that the Options Directories dialog boxes, include, and library paths point to the Windows 3.1 SDK.
- Choose Project Open, select the directory containing your files, give the project a name (for example, TOTOP.MAK), click OK, and then answer Yes to create.
- In the Edit dialog box, change file type to All Files (*.*) and double-click on TOTOP.C, TOTOP.RC, and TOTOP.DEF; and then click OK.
- Ensure that Options Project is set to Windows EXE. You can change other things, such as the memory model, optimizations, and so on.
- Choose Project Rebuild all. When the compile is done, TOTOP.EXE is ready to go.

To compile using Microsoft C/C++ 7.0, the step-by-step procedure is

- Start PWB;
- Choose Project New Project, select the directory containing your files, and name your project. For example, you'd use C:\MYTOP\TOTOP to put it into the C:\MYTOP directory and call it TOTOP. Set the project template for C runtime support and Windows EXE. Then select OK to get rid of the New Project dialog box.
- In the Edit Project box, double-click on TOTOP.C, TOTOP.RC, and TOTOP.DEF, and then click on Save List.
- Select Project Rebuild all. When the compile is finished, TOTOP.EXE is ready to go. If you want to run it from PWB, don't forget to start WXServer from the Program Manager.

The following is the procedure for using Turbo C++ for Windows (TCW) 1.0 to compile TOTOP:

- Open a DOS window and change into the directory where your files are stored. Enter this command line:

```
RC -r TOTOP.RC
```

This will create TOTOP.RES. Make sure you use the RC.EXE that came

with TCW, not the new RC.EXE that comes with the Windows 3.1 SDK.

- Start TCW. This comes with Borland C++ 3.0 and is also available by itself.
- Choose Project Open project, choose the directory in which your files are stored, and type a project name (for example, TOTOP.PRJ). Then click OK.
- Choose Project Add. In the File Name box, type *.* and hit Enter, then double-click on TOTOP.C, TOTOP.RC, and TOTOP.DEF. Then click the Done button.
- Click Options Application, and ensure that the current settings include linker output as Windows EXE and prolog/epilog as Windows all functions exportable. Use any model (I used small), and check that SS Equals DS (default for memory model). Click OK when these settings are correct.
- Select Compile Build all. You are not finished when the Compile Status box says Success, however. Click OK, then go back to your DOS box and enter this command line:

```
RC -t TOTOP.RES TOTOP.EXE
```

Now the program is ready to go, and it can be run from TCW by pressing Control-F9.

Finally, here's how to make TOTOP with Borland C++ 3.0:

- Start BC.
- Choose Project Open project, get your complete path and filename into the top line of the dialog box (for example, C:\MYTOP\TOTOP.PRJ), then click OK.
- Select Project Add, enter *.* in the Name box, and hit Enter. Double-click on TOTOP.C, TOTOP.RC, and TOTOP.DEF, then click Done.
- Under Options Application, select Windows App and hit OK.
- Select Compile Build all. When the compile is done, the program is ready to go. You cannot start TOTOP.EXE from BC, even if you're running BC in a window under Windows. Do a Program Manager File Run, or run TDW to execute TOTOP.EXE.

—John Deurbrouck

valid handles has never been a good idea, I'm not inclined to break the habit of handling this potential error.

It would have been faster to load all four possible cursors while TOTOP itself was loading. Since Top or Bottom actions always take place after a user menu choice, however, it seemed better to reduce the drain on system resources than to save the minute amount of time needed to load the cursor each time.

DoTopBottomAction() sets three more global variables. The first is nShowingOkCursor, which will be used later

when processing WM_MOUSEMOVE messages. A nonzero value for nShowingOkCursor simply means that TOTOP is displaying the cursor that tells the user that the desired action is possible at the current cursor location. The second is nGotLButtonDown, which TOTOP uses when processing the WM_LBUTTONDOWN message. Its zero value means that TOTOP has not yet received the WM_LBUTTONDOWN message and so should not act on a WM_LBUTTONDOWNUP.

The third variable is nSuccess. When

TOTOP releases the mouse and goes dormant, it does a MessageBeep() if nSuccess is zero. This feedback tells the user whether a window was successfully floated or sunk. The nSuccess variable is made nonzero in TopBottomWindowAtPoint().

When nDoingTopBottomAction is nonzero, TOTOP actually processes all mouse messages. Any mouse button manipulation except WM_LBUTTONDOWN and WM_LBUTTONUP result in canceling TOTOP's operation by calling StopDoingTopBottomAction(). This function sets nDoingTopBottomAction to zero, restores the original cursor, destroys any cursors that were loaded, calls ReleaseCapture(), and does a MessageBeep() if nSuccess is 0.

While TOTOP is active, the mouse cursor must indicate clearly whether the mouse is pointing at a window that can be floated or sunk. This is achieved by processing WM_MOUSEMOVE messages. A call to GetMessagePos() retrieves the mouse cursor's position. The IsDoable() function tells TOTOP whether the desired action is permissible at the current position. If another cursor must be displayed, TOTOP switches cursors and updates nShowingOkCursor.

TWO VITAL FUNCTIONS The IsDoable() function is designed to return a window handle for a given point on-screen if the window in question can be processed in accordance with the value of nDoingTopBottomAction. Thus, for example, if the cursor is over the desktop, IsDoable() returns NULL. If the cursor is over a topmost window, IsDoable() returns the window handle only if nDoingTopBottomAction is DO_BOTTOM. When the window is not a topmost window, IsDoable() returns the window handle only if the nDoingTopBottomAction is DO_TOP.

IsDoable() looks first at nDoingTopBottomAction. If that is 0, IsDoable() returns NULL. Then the variable desktop gets the result from GetDesktopWindow(). Next, WindowFromPoint() gets the window handle associated with the pixel the mouse cursor indicates.

If WindowFromPoint() returns 0, or if the point is on the desktop, TOTOP returns NULL. It certainly wouldn't do to make the desktop a topmost window!

Remember, however, that the window

■ The Active App and the Z-Order

Windows 1.x had only tiled windows. If you wanted one application to occupy most of the screen you had to make room for it by shrinking other windows. The overlapping windows of Windows 2.x were a major improvement. The windows could now appear to be stacked on top of each other, with the active application always on top of the pile.

Windows keeps track of this layering by maintaining what is called a Z-order list. Just as X and Y set horizontal and vertical positions, the Z value for a window determines its apparent height; that is, its relative distance from the user. Each window has an associated Z value, and the window with the highest Z value is always unobscured. The next window is visible except where obscured by the first window, and so on.

Indeed, the pile of windows in 2.x and 3.0 was always ordered with the active application on top, the next most recently used application right below it, and so on. There is a compelling logic to this design, because the user is presumably most interested in seeing the window with which interaction is in progress.

But what should you do about such utilities as WINFSR (Windows, November 12, 1991), which monitors your Free System Resources? Even when you're using a full-screen application, you might want to monitor what percentage of your system resources you're using. Or if you operate

WinWord as a full-screen application and you need help to perform a function, you probably want to see the help while interacting with WinWord. To solve this problem, Microsoft added an Always on Top option for WinHelp in Windows 3.1. This lets WinHelp float above WinWord even when WinWord is running full-screen.

The Z-order itself remains unchanged, with the active application at the top of the Z-order. But applications can now *project* themselves above their positions in the Z-order. A window does this by telling Windows that it wants to be a topmost window. (For details, see the discussion of TopBottomWindowAtPoint() in the text.) Windows then uses the same Z-order it always used, but it projects topmost windows above the others. Since the Z-order is unchanged, a projected window lower in the Z-order can entirely or partially obscure the active application at the top of the Z-order.

This design is simple and elegant, in that the basic handling of the display is unchanged. It can also be dangerous, however, because the window at the top of the Z-order (the active application) won't necessarily be a topmost window. If a projected topmost window obscures the application, you won't be able to see what you're working on! Still, topmost windows, used with restraint, can add a lot to the convenience of working with Windows.—John Deurbrouck

Miriam Liskin, PC Magazine, and FoxPro 2.0. Three Pros, No Cons.



ISBN 1-56276-038-6
Price \$39.95

Miriam Liskin, *PC Magazine*, and FoxPro 2.0. They're all recognized as the very best at what they do. Now they have teamed up to deliver *PC Magazine Programming FoxPro 2.0*, one exhaustive volume that covers the FoxPro language itself and the practical skills you need to take your applications from first vision to finished product. Concepts and techniques are explained in plain English, and are backed up by one disk full of sample forms, programs, and databases.

Available
at fine
bookstores,
or call

1-800-688-0448
ext. 1215



© 1992 Ziff-Davis Press

■ PC Magazine Utilities Updates

As with all good software, the programs presented in PC Magazine are upgraded and improved. Here's a partial list of the programs on PC MagNet that have been updated. To download these files from the Utilities/Tips Forum, type GO ZNT: TIPS, type LIB or select Libraries from the menu, then select Library 2 PCMAG UTILS. Type DOW and the filename listed below (for example, DOW ANSI.COM), or select Download a File from the menu.

ANSI.COM, Version 1.3
BAT2EXEC.COM, Version 1.5
BCOPY, Version 1.2
CARDFILE.COM, Version 1.1
CHKFRAG.EXE, Version 1.7
CONFIG.CTL, Version 3.0
DIRMATCH.COM, Version 3.1
EMMA.COM, Version 2.2

EMS40.SYS, Version 1.1
PCACCESS.EXE, Version 1.1
RN.COM, Version 3.0
SCHEDULE.COM, Version 1.1
SLICE.COM, Version 1.3
SNIPPER.COM, Version 1.2
ZCOPY.COM, Version 1.4

For a list of the programs that are available on PC MagNet, download PCMCAT.ZIP from Library 0 (New Uploads) of the Utilities/Tips Forum.

A downloadable index to *PC Magazine's* product reviews is also available in Library 1 (General Info). PCM.EXE is a self-extracting file containing the Computer Library *PC Magazine Reviews Index* for January 1988 through December 1991. It requires the search files in PCSRCH.EXE.

handle returned has not yet been identified as the exact window to be checked and ultimately floated or sunk. That's because many applications display windows that have other windows embedded in them. Most controls, for example, are actually independent windows. It would hardly do to float the window of an OK button or a scroll bar peeking through a nontopmost application. The handle that is needed is that of the parent of such a window. The parent window should be the target unless, of course, the window has no parent or its parent is the desktop. Therefore, `IsDoable()` follows the chain to its origin, stopping when there is no parent or the parent is the desktop.

At this point the variable `child` is the handle of TOTOP's targeted application. `GetWindowLong()` is called with the parameter `GWL_EXSTYLE` to get the extended style for the target window. If the `WS_EX_TOPMOST` bit comes back set, the window is already a topmost window. If the bit is not set, the window is not in the topmost layer. Therefore, if the bit is set and `nDoingTopBottomAction` is `DO_BOTTOM`, the window can be sunk, so TOTOP returns the window handle it has obtained. If the bit is not set and `DO_TOP` is the desired action, again TOTOP can return the window handle. Oth-

erwise, the desired action cannot be performed, so the return is NULL.

The `TopBottomWindowAtPoint()` function just adds or eliminates the targeted window's topmost attribute. (The way in which Microsoft keeps track of the various window layers is discussed in the sidebar "The Active App and the Z-Order.") `TopBottomWindowAtPoint()` first uses `IsDoable()` to get the handle for the window to be sunk or floated. If the result is NULL, the function just returns. If not, `nDoingTopBottomAction` is used to choose between `HWND_TOPMOST` and `HWND_NOTOPMOST` for the call to `SetWindowPos()`. If `SetWindowPos()` is successful, `nSuccess` is set to 1, and TOTOP has done its work.

IN SUMMARY The ability to float windows is a most convenient Windows enhancement. I hope that Microsoft obviates the need for TOTOP by adding an Always on Top option to the default system menu of every application. In the meantime, TOTOP—used sparingly—can make Windows a more productive environment for you. □

JOHN DEURBROUCK IS A C AND 80x86 ASSEMBLY PROGRAMMER IN MOUNTLAKE TERRACE, WASHINGTON.

**“IN CASE YOU
HAVEN’T HEARD,
THERE’S A PC WAR
GOING ON.”**

"GOOD THING WE HAVE



For the past ten years, we've been listening to you. And we've responded—adding new features, improving performance, keeping prices low and value high.

You said you wanted more for your money.

We respond: Our new Value System line of PCs is priced incredibly low. And because you don't want to give up power for low price, this series features a Cyrix microprocessor and Intel's latest chip-doubling technology.

You said you wanted more power in a smaller box.

We respond: Check out the Baby AT-style chassis in our new desktop line. It's all the power you need in a smaller footprint machine!

A SECRET WEAPON."

BILL HAYDEN, CHAIRMAN, COMPUADD COMPUTER CORPORATION

You said you wanted state-of-the-art notebook PCs.

We respond: With extras like a built-in trackball, modem and fax/modem card, our top-of-the-line notebook gives you the multi-tasking environment of a desktop out on the road!

You said you wanted 'round-the-clock service. We

respond: CompuAdd's quality tech support now comes 24 hours a day, seven days a week. And we've enhanced other service programs as well....

CompuAdd is customer driven, by design. It's more than a slogan; it's the way we're winning this war. Give us a call at 1-800-777-2124. We're ready to listen, and respond.

CompuAdd
CUSTOMER DRIVEN, BY DESIGN.

**"WE'VE HEARD A LOT OF
OF PCs. AT THESE PRICES,**



COMPLAINING ABOUT THE COST IT'S NOT FROM OUR CUSTOMERS."

LOW-PROFILE VALUE SYSTEMS INCLUDE:

COMPUADD 325S

— NEW! —

\$999

An i386SX microprocessor rated at 25MHz ■ 40MB hard drive ■ 1MB RAM upgradeable to 16MB on the motherboard ■ 14" VGA color monitor ■ 5 expansion slots ■ 1 parallel and 2 serial interfaces ■ Choice of floppy drive ■ MS-DOS 5.0 preloaded ■ One year onsite service option

COMPUADD 425SLC

— NEW! —

\$1499

A 486SLC Cyrix microprocessor rated at 25MHz ■ 80MB hard drive ■ 2MB RAM upgradeable to 16MB on the motherboard ■ 1KB on-chip cache memory ■ 14" Hi-Res VGA (1024x768) .28 dot pitch color monitor ■ 5 expansion slots ■ 1 parallel and 2 serial interfaces ■ Integrated dual media drive ■ MS-DOS 5.0 preloaded ■ One year onsite service option

COMPUADD 433DLC

— NEW! —

\$1899

A 486DLC Cyrix microprocessor and math coprocessor rated at 33MHz ■ 120MB hard drive ■ 4MB RAM upgradeable to 32MB on the motherboard ■ 1KB on-chip cache memory ■ 64KB external cache option ■ 14" Hi-Res VGA (1024x768) .28 dot pitch color monitor ■ 5 expansion slots ■ 1 parallel and 2 serial interfaces ■ Integrated dual media drive ■ MS-DOS 5.0 and Windows 3.1 preloaded ■ One year free onsite service

CompuAdd has always excelled in the price-to-performance equation. Now our Value Systems add new meaning to the term "value." With workhorse systems that start at \$899, this line will satisfy even the most price-conscious buyer.

Seven new desktop and tower PCs in this series offer a range to meet all your computing needs—even a 33MHz 486DLC processor in a low-profile configuration—and *all* models can be configured to your specifications. CompuAdd also introduces Cyrix's line of powerful microprocessors and Intel's chip-doubling technology, both available in a new space-saving chassis!

All Value Systems are backed by CompuAdd's one-year warranty, 30-day money-back guarantee, and enhanced 'Round-the-Clock toll-free technical support that lets you call 24 hours a day, 7 days a week. Next day onsite service comes free on most Value Systems. The configurations listed here are some of the custom-built Value Systems we sell; call us for other video and memory options. When you do, you'll agree: the Value System series is something to cheer about!

CompuAdd
CUSTOMER DRIVEN, BY DESIGN.

TO ORDER CALL 800-777-2124

"THERE'S A LOT OF DEMAND FOR OF QUESTIONS ABOUT ITS PRICE."

We heard you wanted 486 performance in affordable systems. In response, we've added these 433 and 450 PCs built around Cyrix technology and Intel's speed-doubling technology, for more value and lower cost.

You asked for more power in less space. We respond: Our Value Systems feature a new space-saving "Baby AT" chassis with bays for up to seven external and internal devices. You can load it with all the peripherals, extra hard drives, CD-ROMs you may want.

For the high performance of an advanced 50MHz i486DX system, try the new CompuAdd 450 using the chip-doubling technology of Intel's 450DX2 microprocessor.

For those who prefer floor-standing configurations, the servers offer eight expansion slots and up to seven device bays, giving you all the expansion capabilities you may need when you're building a network system.

And choice is built in to the Value System! The 433DLC and the 450 both come in either our new smaller chassis or in a tower configuration.

CompuAdd
CUSTOMER DRIVEN. BY DESIGN.

*Six available
expansion slots*

*Two 3 1/2" internal
drive bays*

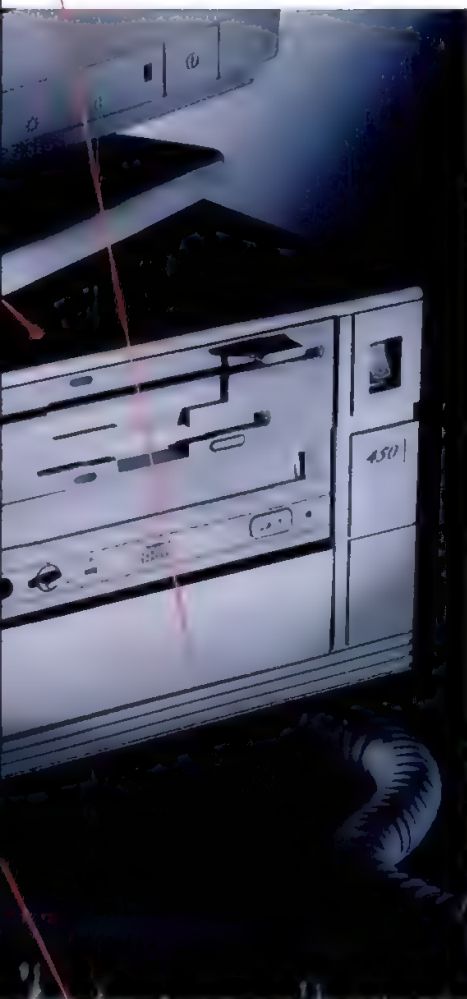


*Over 4" narrower for
20% less desk space!*

TO ORDER CALL 800-777-2124

486 PERFORMANCE AND A LOT WELL, HERE'S YOUR ANSWER."

Three 5 1/4" external drive bays



Two 3 1/2" drive bays

THE 433DLC AND THE 450 ARE BOTH AVAILABLE IN BABY-AT AND TOWER CONFIGURATIONS...



COMPUADD 433DLC

NEW!

\$1999

A "baby-AT" chassis featuring a 486DLC Cyrix microprocessor and math coprocessor rated at 33MHz
 ■ 120MB hard drive ■ 4MB RAM upgradeable to 32MB on the mother-board ■ 1KB on-chip cache memory ■ 64KB external cache option ■ 14" Hi-Rez VGA (1024x768) .28 dot pitch color monitor ■ 6 expansion slots ■ Up to 7 device bays ■ 1 parallel and 2 serial interfaces ■ Integrated dual media drive ■ MS-DOS 5.0 and Windows 3.1 preloaded ■ One year free onsite service



COMPUADD 450

NEW!

\$2399

A tower configuration bringing you 50MHz performance, featuring Intel's i486DX2 speed-doubling technology ■ 120MB hard drive ■ 4MB RAM upgradeable to 32MB on the motherboard ■ 8KB on-chip cache memory ■ 64KB external cache option ■ 14" Hi-Rez VGA (1024x768) .28 dot pitch color monitor ■ 8 expansion slots ■ Up to 7 device bays ■ 1 parallel and 2 serial interfaces ■ Integrated dual media drive ■ MS-DOS 5.0 and Windows 3.1 preloaded ■ One year free onsite service

325TX

NOW ONLY

\$1695

Built-in trackball ■ 386SX microprocessor rated at 25MHz ■ 2MB DRAM expandable to 8MB ■ 80MB hard drive ■ 10" diagonal screen with 64 levels of gray ■ 3.5", 1.44MB floppy disk drive ■ Optional built-in 2400 baud modem with 9600 fax/modem ■ Windows 3.1 and MS-DOS 5.0 preloaded ■ Weighs less than 6 lbs

325TFX

NEW! ONLY

\$2095

Built-in trackball ■ 386SX microprocessor rated at 25MHz ■ 4MB DRAM expandable to 8MB ■ 80MB hard drive ■ 10" diagonal screen with 64 levels of gray ■ 3.5", 1.44MB floppy disk drive ■ Built-in 2400 baud modem with 9600 fax/modem ■ Windows 3.1 and MS-DOS 5.0 preloaded ■ Weighs less than 6 lbs

425TEX

NEW! ONLY

\$2595

Built-in trackball ■ Cyrix 486SLC microprocessor and math coprocessor rated at 25MHz ■ 4MB DRAM expandable to 8MB ■ 80MB hard drive ■ 1KB on-chip cache memory ■ 10" diagonal screen with 64 levels of gray ■ 3.5", 1.44MB floppy disk drive ■ 2400 baud modem with 9600 fax/modem ■ Windows 3.1 and MS-DOS 5.0 preloaded

CompuAdd notebook PCs make power truly portable and affordable—just as you requested. Sleeker and thinner than other notebooks, they feature preloaded DOS and Windows and a built-in trackball and come with a standard 10" LCD display with 640x480 VGA resolution and a 64 grayscale image.

The CompuAdd 325TX delivers 2MB DRAM, fast performance, and low power consumption for a price less than \$1700. Our 325TFX gives you a built-in 2400 baud modem and fax/modem card, plus 4MB DRAM for all the power you need to run Windows and other memory-intensive applications.

For 486 power, check out the CompuAdd 425TFX, which also has an internal 2400-baud modem and fax/modem card, 4MB DRAM, 1KB of on-chip cache memory, and a built-in math coprocessor.

CompuAdd's notebook systems are the industry leaders. And for a good reason—we listened when you told us you wanted power, functionality and value. Our notebooks give you nothing less.

CompuAdd®
CUSTOMER DRIVEN. BY DESIGN.

TO ORDER CALL 800-777-2124

**LOW-PRICE NOTEBOOKS SINCE
THE ONLY ONES WHO HEARD YOU?"**



WE USED TO SPEND ALL DAY LISTENING TO YOU. NOW WE STAY UP ALL NIGHT, TOO.

Our new 'Round-the-Clock Response gives you toll-free tech support 24 hours a day, seven days a week—at an average response time of 2.5 minutes! We've also added a HelpLine, for unlimited toll-free support geared to the non-technical user and first-time buyer, and Direct Effect, so you can call toll-free anytime to have complete technical product specs faxed to you. Plus we've extended our limited one-year warranty to two-years coverage on labor. Enhanced services, to fill your needs!

CompuAdd®
CUSTOMER DRIVEN, BY DESIGN.

CompuAdd has 116 stores in 40 states to serve you—call 1-800-999-9901 for the location nearest you. Or order direct!

In Canada call 800-627-1967 or fax 512-250-5760
Other International, call 512-258-5575 or fax 512-250-5760



TO ORDER CALL 800-777-2124



LAB NOTES

Accessing the Windows API from the DOS Box, Part 3

BY ANDREW SCHULMAN

While Windows limits what a DOS program can do, a DOS program can ask a bona fide Windows program to act in its stead. The trick, however, is in finding a Windows program that will act as a surrogate for a DOS program. In last issue's Lab Notes we started to build such a Windows application, CLIPSERV, which carries out the requests that come from DOS programs and that appear in the Windows Clipboard.

To put the DOS programs' requests into the Windows Clipboard, we also built a companion program, CMDCLIP. CMDCLIP demonstrates how DOS programs can place text into the clipboard by using INT 2Fh functions that were described in Part 1 of this article. The special format CMDCLIP uses to put text into the Clipboard enables CLIPSERV to interpret it as a request to be carried out rather than as plain text.

CMDCLIP and CLIPSERV work as a team, but as written, they're rather specialized. So in this third and final part, I want to show you how to generalize the basic CMDCLIP/CLIPSERV mechanism. This will enable CMDCLIP to call (indirectly) any desired Windows application programming interface (API) function, and it will provide you with a technique you can apply when writing other DOS programs.

RUNTIME DYNAMIC LINKING Because the goal is to provide DOS programs with access to *any* Windows API function (indeed, to any function in a Dynamic Link Library, whether or not it is part of the Windows API), CLIPSERV must be able to link to any DLL function without knowing in advance what that function

will be. This requires the use of a documented, but underutilized aspect of Windows called *runtime dynamic linking*. To understand how runtime dynamic linking works, it's good to start by discussing how Windows API functions are normally accessed.

Usually, when a Windows program calls a function such as WinExec(), the

This Part broadens the scope of CLIPSERV and CMDCLIP so you can call any Windows API or DLL function from a DOS application.

call is hard-wired into the program, as shown below:

```
/* in WINDOWS.H */
WORD FAR PASCAL WinExec(LPSTR,
    WORD);
/* in the program */
#include "windows.h"
// ...
WinExec("notepad", SW_NORMAL);
```

In this example, Windows uses *dynamic linking* behind the scenes; that is, Windows links to the appropriate DLL and calls the function at the time the call is performed. But since the header file hard-codes the needed linking information and the main program hard-wires the call to the function, from the program's perspective, the function call doesn't look at all dynamic or flexible.

The inflexibility of this not-so-dynamic linking is usually not noticeable (and doesn't matter), since most programs do know in advance what Windows API function they'll be using. Hard-wired function calls won't do, however, if you want to build a general-purpose program like CLIPSERV, whose job is to call *any* Windows API function on behalf of a DOS program. You could, of course, use brute force to add an element of flexibility by using an *if* statement to select which function to call:

```
if (funcname == "WinExec")
    WinExec(...);
else if (funcname == "SendMessage")
    SendMessage(...);
else if (funcname == "PostMessage")
    PostMessage(...);
else if ...
```

There are limitations to this approach, though. For one thing, since there are something like 1,200 different Windows API functions, this technique would require a prohibitively large *if* statement! Moreover, your program would work only with whatever functions existed (and that you knew about) at the time you built the program. If a new version of Windows or a new DLL became available, you'd have to modify your program to make use of them. Similarly, if you wanted to call functions from DLLs you created after writing the program, you'd be out of luck.

The litmus test for *truly dynamic linking*, then, is whether a program can call functions that didn't exist (or whose names were unknown) when the program was written. It is vital to CLIPSERV's purpose that it be able to call functions in other DLLs, and advance knowledge

of these functions can't be a prerequisite. Somehow, a satisfactory CLIPSERV-type program must be able to link to such functions *while it's running*.

Fortunately, Windows provides just the functionality needed to write such a general-purpose program. Last time, in CLIPSRV1, I took strings such as "CMDCLIP RUN" and turned them into WinExec() calls. For example, when CLIPSRV1 is running and a DOS program puts the string "CMDCLIP RUN notepad.exe" into the Windows Clipboard, CLIPSRV1 interprets this as a signal to call

```
WinExec("notepad.exe", SW_NORMAL)
```

In essence, CLIPSRV1 makes an *association* between RUN and WinExec(). Windows has a similar way of associating function names with actual functions built right in. If you have both the name of a Windows API function and the name of the DLL it lives in, you can get a callable pointer to that function. To get it, you first call another function that will return the desired pointer. This second function might, for example, be called GetProc(). Here's an example of how GetProc() would be used:

```
WORD (FAR PASCAL *WinExec)(LPSTR,
WORD);
WinExec = GetProc("KERNEL",
"WINEEXEC");
if (WinExec != 0)
(*WinExec)("notepad", SW_NORMAL);
else
fail("Can't find WinExec
function!");
```

In the above code WinExec is a function pointer: It holds the address of the WinExec() function in memory. Since (*f)(x) and f(x) are equivalent in ANSI C, the way the function is called isn't all that different from the way you'd normally call WinExec. What's different is how the program gets WinExec's address in the first place.

Ordinarily, a program relies on Windows to take care of this when the program is loaded; that is, before the program even starts running. This "normal" form of dynamic linking in Windows is called *load-time dynamic linking*. In the code excerpt above, however, the pro-

gram calls a function, GetProc(), to do the dynamic linking. Since this takes place while the program is running, it is called *runtime dynamic linking*.

GetProc() is not part of the Windows API. As shown in Figure 1, it is built by using the Windows API functions GetModuleHandle(), LoadLibrary(), and GetProcAddress(). GetProc() first tries to use GetModuleHandle() to turn a module name (such as KERNEL) into a module handle. If that fails (for example, if the named module hasn't been loaded yet), GetProc() uses LoadLibrary(). Once it has a module handle, GetProc() passes the handle, along with the name of the function (such as WINEEXEC), to the GetProcAddress() function. GetProcAddress() then returns a far pointer to the function.

Windows applications that use a macro language (like Microsoft Word for Windows) will almost always contain a statement (for example, Declare) that lets you call Windows API functions and functions in other DLLs from the macro language. For instance, in a Lab Notes on Word Basic (PC Magazine, October 29, 1991), I showed the following code to readers:

```
Declare Sub MyShell Lib "kernel" \
(lpCmdStr$, nCmdShow As Integer) \
Alias "WinExec"
Sub MAIN
MyShell "notepad", 1
End Sub
```

Now that you know about runtime dynamic linking, it becomes clear that WinWord is internally using a function very much like GetProc() to implement the Declare Sub statement. In the example above, the string "kernel" gets passed as the first argument, and the string "WinExec" gets passed as the second argument.

Thus, if we build something like GetProc() into CLIPSERV, add some way to handle parameters to the functions, and give CLIPSERV a new DYNLINK keyword in addition to the RUN, SETTITLE, and EXIT keywords it already knows about, the result will be that we can let a DOS

program call *any* Windows API function by simply passing in its string name and some representation of the function's arguments. An example might look like this:

```
CMDCLIP DYNLINK kernel winexec
notepad 1
```

Since almost all functions that a program is likely to want will be in one of three core Windows DLLs—KERNEL, USER, or GDI—we can do better than this. CLIPSERV could look in those three places automatically without the DOS program having to specify those modules. However, since the DOS program might want to call other DLLs, it's a bit faster if the DOS program *does* specify the module. We can allow that by adding some syntactic sugar that lets us specify a function in a particular DLL by prefixing the function name with the DLL name and an exclamation point. Thus, the strings that CLIPSERV accepts will actually look like this:

```
CMDCLIP DYNLINK winexec notepad 1
```

or:

```
CMDCLIP DYNLINK kernel!winexec
"notepad" 1
```

HANDLING FUNCTION-PARAMETER TYPES

In addition to showing how CLIPSERV expects to receive function names, these examples also give you some idea of how it wants to be told about function arguments. First of all, a string such as "notepad" can simply be typed in, either as is or enclosed within quotation marks. The quotation marks are required if the string contains any spaces. Consider this:

```
CMDCLIP DYNLINK winexec
"notepad hello.txt" 1
```

GetProc()

```
FARPROC GetProc(char *modname, char *funcname)
{
WORD hModule;
if (! (hModule = GetModuleHandle(modname)))
if (! (hModule = LoadLibrary(modname)))
return 0;
return GetProcAddress(hModule, funcname);
}
```

Figure 1: The GetProc() procedure uses runtime dynamic linking in Windows.

But how about the number 1, the second argument being passed to WinExec()? In a Windows program, a normal call would look something like this:

```
WinExec("notepad", SW_NORMAL);
```

CLIPSERV doesn't "know" about such constants since they are not built into Windows the same way as the string "WINEXEC" is. Constants are in a Windows SDK include file, WINDOWS.H. This means you must look up constants such as SW_NORMAL and type in the equivalent raw number—a messy business. (I'll deal with this problem later.)

In any case, we can see that CLIPSERV must be able to take a string such as "1" and figure out that it should be passed to WinExec(), not as a string, but as a 2-byte integer. CLIPSERV does this by including a type() function, which uses some fairly simple but effective rules to determine the type of an argument. The code for type() is shown in Figure 2. The result is that CLIPSERV can properly call SendMessage(hWnd, msg, wParam, lParam) on the basis of these instructions:

```
CMDCLIP DYNLINK sendmessage 0x1234
0x0C 0 "hello world"
```

In this illustration, 0x1234 is a hypothetical window handle (HWND). (I'll show you below how the DOS program would get that HWND handle in the first place.) 0x0C is the message number for WM_SETTEXT. 0 is the unused wParam, and "hello world" is the lParam. The result is that the specified window's text will be set, by a DOS program, to "hello world".

PUSHING ARGUMENTS When it receives a string on the Windows Clipboard,

CLIPSERV has to do more than figure out what function to call and what type its arguments are. CLIPSERV actually has to *pass* all the arguments to the function. Because CLIPSERV is a general-purpose program, it not only has no idea what function it will be asked to call; it also has no idea how many arguments the function expects or what type they will be. (Nor does it know about the function's return value, but I'll discuss this later.) Somehow CLIPSERV needs a very generic way of making function calls. The same program has to be able to handle this:

```
CMDCLIP DYNLINK winexec notepad 1
```

or this:

```
CMDCLIP DYNLINK sendmessage 0x1234
0x0C "hello world" 0L
```

Every Windows programmer has probably heard of GENERIC.C, the "mother all Windows programs" that comes with the SDK. Well, CLIPSERV *really* is generic! When it receives a string such as the one shown above on the Windows Clipboard, CLIPSERV must:

- Call GetProc() to get a function pointer to SendMessage() in USER;
- Push the two-byte integer 0x1234, which SendMessage() will interpret as the HWND of the window to be sent this message, on the stack;
- Push the integer 0x0C, representing the WM_SETTEXT message, on the stack;
- Push the integer 0 (unused wParam) on the stack;
- Push a 4-byte far pointer to the string "hello world" on the stack, as the lParam;
- With its arguments now on the stack, call the SendMessage() function pointer;

- Take SendMessage()'s 2-byte return value from the AX register, turn it into a NULL-terminated ASCII string, and put it into the Clipboard.

To accomplish all this requires adding to CLIPSERV what is, essentially, a tiny interpreter that uses a "push loop" to turn string arguments from the Clipboard into actual arguments on the function's stack. The interpreter code is contained in a file, DYNLINK.C, that gets linked with CLIPSERV.C. Unfortunately, even a tiny interpreter is too large to list here in its entirety, though it is presented in outline form in Figure 3. As usual, however, you can download the source code for DYNLINK.C (and any other source and corresponding executables presented in this series) from PC MagNet, archived as CLIP3.ZIP. If you don't have access to PC MagNet, you can receive it by mail. Just send a postcard with your name, address, and preferred disk size to the attention of Katherine West, Lab Notes, PC Magazine, One Park Ave., New York, NY 10016.

In summary, then, CLIPSERV thus comes to consist of the old CLIPSRV1 code plus a runtime dynamic linking routine similar to GetProc() in Figure 1, the type() function in Figure 2, and its interpreter, DYNLINK.

It's worth looking in detail at the "push loop" part of the code from DYNLINK.C, which is shown in Figure 4. For each argument, the push loop uses the type() function from Figure 2 to determine the type of an argument. The switch statement in the PUSH_ARG() macro determines, for a given type, *what* should be pushed. If the argument is of typ_string, then a 4-byte pointer to the string is pushed on the stack. If the argument is of typ_word, it is converted into

type()

```
/*
type() uses some dumb rules to determine the type of an argument:
if first character of arg is a digit or '-'
    and if arg contains '.' then it's a floating-point number
    else if last character is an 'L' then it's a long
    else it's a unsigned word
else if first character is an apostrophe
    it's a single-byte character
otherwise
    it's a string
    if the first char
*/

typedef enum { typ_string, typ_byte, typ_word, typ_long, typ_float,
typ_buffer, typ_hwnd } TYPE;

TYPE type(char *arg)
```

```
{
if (isdigit(arg[0]) || (arg[0] == '-' && isdigit(arg[1])))
{
char *p = arg;
while (*p)
if (*p++ == '.')
return typ_float;
return (*--p == 'L') ? typ_long : typ_word;
}
else if (strcmp(arg, "buf") == 0)
return typ_buffer; // push far ptr to 1k buffer
else if (strcmp(arg, "hwnd") == 0)
return typ_hwnd; // push caller's HWND
else
return (arg[0] == '\\') ? typ_byte : typ_string;
}
```

Figure 2: CLIPSERV uses this type() function to determine what type an argument belongs to.

a 2-byte number, and that is pushed. (The conversion is handled by `axtol()`, a function that converts a decimal- or hex-formatted string such as "1234" or "0x1234" or "1234:5678" into an actual 4-byte long number.) The `push()` function relies on a lovely trick that I learned from a book on OS/2 programming by David Cortesi: If you use the Pascal calling convention, the C function `push()` pushes its argument, of whatever size, on the stack and leaves it there.

GETTING RETURN VALUES The arguments to the function are now on the stack. CLIPSERV must call the function, get its return value, and put this return value someplace where the DOS program can get at it. Getting return values is easy in programs that know in advance what functions they're calling. In this generic program, however, we have no idea what the function will return: It could be

an integer, a long, a string, or a floating-point number.

CLIPSERV must put the return value into the Windows Clipboard in the form of a string so the DOS program can access it. But what should be the *format* of this string representation? The DOS program might want to have some say in how the string is formatted, for instance whether a numeric return value should be turned into a decimal or into a hexadecimal string.

The answer to both problems is to let the DOS program specify both the size and format for the return value by using an optional `printf()` mask. For example, if you call the Windows `GetVersion()` function from the CMDCLIP command line without specifying a return value, it comes back as a 2-byte number formatted with the `printf` mask `0x%04`, which is CLIPSERV's default.

CLIPSERV's default is:

```
C:\PCMAG>cmdclip dynlink getversion
0x0a03
```

The 0x0a03 means that Windows 3.1 is the operating environment (0x0a is, of course, hexadecimal for the number 10). If you want that to be formatted a little differently, you can specify an explicit mask:

```
C:\PCMAG>cmdclip dynlink getversion
%04X
0A03
```

In Windows 3.1, `GetVersion()` actually returns a 4-byte number, with the Windows version number found at one end and the DOS version at the other. You can use the `printf` mask to print out all four bytes:

dynlink

```
dynlink(char *clipboard_contents)
{
    FARPROC funcptr;
    int argc;
    char argv[MAX_ARGS];

    argc = split(clipboard_contents, argv); // tokenize string

    use argv[1] to get function pointer:
    if (argv[1] contains '|')
        use explicit module name
    else
        try first USER, then KERNEL, then GDI
    funcptr = GetProc(modname, funcname);

    use optional printf mask for size and format of return value:
    if (argv[argc-1] contains %)
        retval_mask = argv[--argc]

    push loop:
```

```
for each argument (order depends on Pascal vs. cdecl)
    switch (type(argv))
        case typ_string:  push((char far *) argv); break;
        case typ_word:    push((unsigned) axtol(argv)); break;
        case typ_long:    push(axtol(argv)); break;
        ...

arguments are already on the stack -- call the function:
(*funcptr)();

get return value:
switch (retval_type from retval_mask)
    case typ_string:  sprintf(buf, retval_mask, DX:AX); break;
    case typ_word:    sprintf(buf, retval_mask, AX); break;
    case typ_long:    sprintf(buf, retval_mask, DX:AX); break;
    ...

put return value into clipboard:
put_clip_str(buf);
}
```

Figure 3: This listing presents a pseudocode outline for the runtime dynamic-linking interpreter used in CLIPSERV.

DYNLINK.C

Partial Listing

```
/* push(): a trick that relies on pascal calling convention */
void pascal push() { }

// push args on stack, count # of words
#define PUSH_ARG(arg) \
{ \
    switch (type(arg)) \
    { \
        case typ_buffer: push((char far *) the_buffer); c += 2; break; \
        case typ_hwnd:   push(hwnd); c += 1; \
        case typ_string: push((char far *) arg); c += 2; break; \
        case typ_byte:   push(arg[1]); c += 1; break; \
        case typ_word:   push((unsigned) axtol(arg)); c += 1; break; \
        case typ_long:   push(axtol(arg)); c += 2; break; \
        case typ_float:  push(atof(arg)); c += 4; break; \
    } \
}

// ...

/* push_loop */
if (is_cdecl)
{
    /* push in reverse order for cdecl */
    for (i=argc-1, c=0; i>=start_arg; i--)
        PUSH_ARG(argv[i]);
}
```

```

}
else
{
    for (i=start_arg, c=0; i<argc; i++)
        PUSH_ARG(argv[i]);
}

// ...

/* Convert a string to a long number: accepts decimal,
hex, or seg:ofs far pointer */
unsigned long axtol(char *s)
{
    unsigned long ret;
    if (s[0]!='0' && s[1]!='x')
    {
        sscanf(s+2, "%lx", &ret);
        return ret;
    }
    else if (strchr(s, ':'))
    {
        sscanf(s, "%Pp", &ret);
        return ret;
    }
    else
        return atol(s);
}
```

Figure 4: This partial listing of DYNLINK.C shows the code used to push arguments on the stack.


```
C:\PCMAG>cmdclip dynlink getversion
%08lX
05000A03
```

This reply shows that CMDCLIP was running under DOS 5.0 and Windows 3.1. It doesn't display it very well, but remember that CMDCLIP is just a user-interface on top of the PutClipString() and GetClipString() functions. Programs other than CMDCLIP can be built to talk to CLIPSERV, and they can format the return value from GetVersion() or from any other Windows API function, however they want.

Figure 5 shows how the code that processes these printf() masks works. Using

```
"cmdclip dynlink getversion %08lX"
```

as an example, the printf mask is %08lX, and the retval_type() returns that this is typ_long. Thus the switch statement shown in Figure 5 casts the generic function pointer f—which by now holds a pointer to GetVersion()—to a LONGFN and makes the actual call (the whole point of this program!) inside a wsprintf() call like so:

```
case typ_long:
    wsprintf(buf, mask,
        ((LONGFN) f)());
```

GetVersion() expects no parameters, so it isn't a very realistic example. How-

ever, even a function that *did* expect parameters would be called in the same way, for the parameters are already on the stack, where the push loop put them.

GETTING USEFUL PARAMETERS There is still a big question about how you get useful parameters to Windows API functions when you're running in the DOS box. Earlier I used SendMessage() as an example, and I just made up the window handle (HWND) 0x1234. The question is, where would you get a real window handle when you're running in the DOS box?

From a Windows API call, of course! In the three illustrative command lines below, I'll use CMDCLIP

- to launch the Window Clock,
- to find its window handle (using the FindWindow() function and the Clock window_class name_), and then use that window handle
- to change Clock's title bar to "It's lunch time!":

```
C:\PCMAG>cmdclip dynlink winexec
clock 1
0x10c6
C:\PCMAG>cmdclip dynlink findwindow
"Clock" 0L
0x19a8
C:\PCMAG>cmdclip dynlink
setwindowtext 0x19a8 "It's lunch
time!"
0x0000
```

What if a program running in the DOS

box wants to get its *own* window handle? One way would be to use the CMDCLIP equivalent of FindWindow("tty", 0L), since "tty" is the window class name for DOS boxes. Thus,

```
C:\PCMAG>cmdclip dynlink findwindow
tty
0L
```

However, if there was more than one DOS box running, this might return the handle to a different DOS box. A better idea, therefore, is to use the @hwnd variable built into CLIPSERV. Specifying @hwnd will cause CLIPSERV to use the window handle of whoever made the dynlink request. Thus,

```
C:\PCMAG>cmdclip dynlink
setwindowtext @hwnd "Hello world"
```

A similar variable is @buf, which turns into a 4-byte far pointer to a 1K buffer built into CLIPSERV. You can use @buf whenever a function needs to "side effect" a block of memory. You might want to get your window's title, using the Windows GetWindowText() function. This function expects as one of its parameters a far pointer to a buffer. To get a buffer you could, of course, call GlobalAlloc() via CMDCLIP. However, CLIPSERV makes life even easier for its clients by giving them a ready-to-use 1K block of memory. The command line would read:

DYNLINK.C

Partial Listing

```
typedef unsigned (far *FN)();
typedef char far * (far *STRFN)();
typedef char (far *BYTEFN)();
typedef unsigned (far *WORDFN)();
typedef unsigned long (far *LONGFN)();
typedef double (far pascal *FLOATFN)();

static char buf[128];
FN f;
TYPE retval_type = typ_word;

// ... f = (FN) GetProc(modname, funcname) ...

/* handle optional printf mask */
if (strchr(argv[argc-1], '%'))
    retval_type = retval_type(mask = argv[--argc]);

// ... push loop here ...

/* args are on the stack : call (*f)() and print retval */
switch (retval_type)
{
    case typ_string: wsprintf(buf, mask, ((STRFN) f)()); break;
    case typ_byte:   wsprintf(buf, mask, ((BYTEFN) f)()); break;
    case typ_word:   wsprintf(buf, mask, f()); break;
    case typ_long:   wsprintf(buf, mask, ((LONGFN) f)()); break;
    case typ_float:  wsprintf(buf, mask, ((FLOATFN) f)()); break;
}
```

```
// ...
put_clip_str(buf);
// ...

/* retval_type() uses a printf() mask (e.g., %s or %lX)
to determine the return value's type */
TYPE retval_type(char *s)
{
    while (*s)
    {
        switch (*s)
        {
            case 's' : return typ_string; break; // %s or %fs
            case 'c' : return typ_byte; break; // %c
            case 'l' : case 'i' : case 'o' : case 'u' :
                return typ_long; break; // %lX, etc.
            case 'e' : case 'E' : case 'f' : case 'g' : case 'G' :
                return typ_float; break; // %f, etc.
        }
        s++;
    }

    /* still here */
    return typ_word; // %u, %d, %x, etc.
}
```

Figure 5: This excerpt contains the DYNLINK.C code that handles return values and actually calls the function.


```
C:\PC\MAG>cmdclip dynlink
getwindowtext @hwnd @buf 128
```

REMOTE PROCEDURE CALLING CMD-CLIP shows how Windows API calls can be provided on the DOS side of the fence. It is little more than a demonstration, however, of such remote procedure calling. When writing DOS programs you would probably want to call these functions from your own program, not from a mini-interpreter operated from the command line.

To call a Windows function such as `WinExec()` from a DOS program, you need to have CLIPSERV on the Windows side of the fence. The other thing you need is a *stub function*, whose job is to look as much as possible like the Windows function that you actually want to call; and to take care of marshalling its arguments to send to CLIPSERV.

Figure 6 provides DOS remote-procedure call versions of `WinExec()` and `SendMessage()` as illustrative examples. Calling these functions from a DOS program looks much like calling them from a Windows program. The only difference is that they take a little longer to execute, because, under the hood, the functions are furiously busy passing their parameters to CLIPSERV and getting back their return values via the Clipboard.

There is actually one other difference in the `SendMessage()` function: The DOS version takes an additional argument. `SendMessage()` is sometimes called with

an `LPARAM` holding a far pointer to a string; at other times, the `LPARAM` could also hold a 4-byte number. Any DOS program that calls this version of `SendMessage()` is running in a different address space from the genuine `SendMessage()` function in Windows. This means that the DOS program's far pointer would be meaningless to `SendMessage()`.

Since the DOS version of `SendMessage()` can't send over a far pointer, it has to send over the string itself. This is what I meant, in a comment in last issue's Lab Notes, about "flattening" pointers. The inability to pass pointers to remote functions is one obstacle to achieving transparency; that is, of making the interface to a DOS version of `SendMessage()` look exactly like the Windows version. Still, it's close enough. After all, a while ago we couldn't call `SendMessage()` from DOS at all, and now we're quibbling over an extra parameter! This is progress.

THE PROBLEMS WITH REMOTE CALLS

There are other obstacles to making Windows API calls from the DOS box look exactly like Windows API calls from a Windows program. For one, if you issue a bogus API call from your DOS program, you must remember that it's CLIPSERV that is actually making the call on your behalf. Windows doesn't know about surrogates or servers, and though the fault is yours (as it were), if something is wrong with the way you called the function, CLIPSERV may experience a UAE

or GP (general protection) fault and be shut down.

Help in avoiding such unacceptable shutdowns is available from the Windows ToolHelp library. This library comes with the Windows 3.1 SDK, but it can also run on top of 3.0 and software developers are allowed to redistribute the DLL with their programs for the benefit of 3.0 users. The Windows ToolHelp library contains an extremely useful function called `InterruptRegister()`, which lets Windows programs install a callback function to handle their own GP faults and UAs. By using `InterruptRegister()` to watch for these faults (remember, a GP fault is just an `INT 0Dh`), CLIPSERV will *not* go down because of an error in the way you called a Windows API function. Figure 7 shows how an `InterruptRegister` handler can be used in conjunction with the `Catch()` and `Throw()` functions, which are Windows equivalents of the C `setjmp()` and `longjmp()` functions.

Another problem: Either CMDCLIP or any other DOS program that talks to CLIPSERV needs to loop to get its return value from CLIPSERV. There is just no equivalent to the nice `WM_DRAWCLIPBOARD` wake-up call that CLIPSERV receives. (Windows has its advantages!) In CMDCLIP, I get the return value by calling the `Yield()` function in a loop. This is not only inelegant, but it seems to disclose a problem with the implementation of the `INT 2Fh AX=1680h` `Yield` call in Windows 3.1. The problem

WinExec() and SendMessage()

Partial Listing

```
(a)
typedef int BOOL;
typedef unsigned short WORD;
typedef WORD HWND;
typedef unsigned long DWORD;
typedef char far *LPSTR;

#define SW_NORMAL 1

WORD WinExec(LPSTR cmd, WORD sw)
{
    char buf[128];
    char *s;
    WORD ret;
    sprintf(buf, "CMDCLIP DYNLINK KERNEL!WINEXEC \"%Fs\" %d",
        cmd, sw);
    PutClipString(buf);
    Yield(); // should be loop: see cmdclip.c

    s = GetClipString();
    sscanf(s, "%x", &ret);
    FreeClipString(s);
    return ret;
}

(b)
#define WM_SETTEXT 0x00000000L

DWORD SendMessage(HWND hwnd, WORD msg, WORD wparam,
    DWORD lparam, BOOL str)
{
    char buf[256];
    DWORD ret;
    if (str)
    {
        sprintf(buf, "CMDCLIP DYNLINK USER!SENDMESSAGE "
            "%04x %04x %04x \"%Fs\"",
            hwnd, msg, wparam, (LPSTR) lparam);
    }
    else
    {
        sprintf(buf, "CMDCLIP DYNLINK USER!SENDMESSAGE "
            "%04x %04x %04x %08lx",
            hwnd, msg, wparam, lparam);
    }
    PutClipString(buf);
    Yield(); // should be loop: see cmdclip.c

    s = GetClipString(buf);
    sscanf(s, "%lx", &ret);
    FreeClipString(s);
    return ret;
}
```

Figure 6: These two code excerpts show (a) a DOS version of `WinExec()` that looks like the Windows API `WinExec()` call, but which internally takes care of packaging up its arguments to send to CLIPSERV, and (b) a similar DOS version of `SendMessage()`.

Miriam Liskin, PC Magazine, and FoxPro 2.0. Three Pros, No Cons.



ISBN 1-56276-038-6
Price \$39.95
Available June 1992

Miriam Liskin, *PC Magazine*, and FoxPro 2.0. They're all recognized as the very best at what they do. Now they have teamed up to deliver *PC Magazine Programming FoxPro 2.0*, one exhaustive volume that covers the FoxPro language itself and the practical skills you need to take your applications from first vision to finished product. Sensible design, realistic prototyping, effective documentation—all presented in the comprehensive style that has established Liskin as the premier authority in database instruction. Liskin focuses on the development of typical business applications from the ground up, building your base of programming knowledge and showing you how to put all the pieces together. Concepts and techniques are explained in plain English, and are backed up by one disk full of sample forms, programs, and databases. The disk will save you hours of input and debugging time, while offering you a vast store of code that you can adapt to your own application designs.

Whatever your past programming experience, you'll gain confidence fast with the comprehensive coverage and real-world examples in *PC Magazine Programming FoxPro 2.0*.



© 1992 Ziff-Davis Press

Waldensoftware® Visit your local Waldensoftware or Waldenbooks store, or call to order 1-800-322-2000.
Waldenbooks® Dept. 594, Item #6282. Check your yellow pages for the store nearest you.

DYNLINK.C

Partial Listing

```

static BOOL in_dynlink = 0;
static FARPROC procinst_faulthandler;
static CATCHBUF catchbuf = {0};
static HANDLE clipserve_task = 0;

BOOL dynlink_error(void)
{
    if (Catch(catchbuf) == 0)
        return FALSE;
    else
    {
        put_clip_str("CLIPREPLY DYNLINK ERROR GPFALT");
        return TRUE;
    }
}

BOOL dynlink(HWND hwnd, int argc, char *argv[])
{
    if (dynlink_error()) // catch: come back here on fault
        return FALSE;

    // ...
}

void _export far FaultHandler(void)
{
    static unsigned intnum;

    _asm mov ax, word ptr [bp+8]
    _asm mov intnum, ax

    if ((in_dynlink) &&
        (intnum == 0x0d) &&
        (GetCurrentTask() == clipserve_task))
        Throw(catchbuf, 1);
    else
        return;
}

void init_dynlink(HANDLE hInstance)
{
    /* use TOOLHELP to install GP fault handler for DYNLINK */
    clipserve_task = GetCurrentTask();
    procinst_faulthandler =
        MakeProcInstance((FARPROC) FaultHandler, hInstance);
    if (! InterruptRegister(0, procinst_faulthandler))
        fail("Can't register GP fault handler!");
}

void fini_dynlink(void)
{
    InterruptUnRegister(0);
    FreeProcInstance(procinst_faulthandler);
}

```

Figure 7: This excerpt from DYNLINK.C contains the GP fault-handling code. A Windows program can use InterruptRegister() to catch its own UAEs.

is that once a DOS box calls Yield, it almost never gets scheduled to run! By substituting DOS INT 28h Idle calls for the INT 2Fh AX=1680h call, I've got CMDCLIP working more reliably.

Other problems aren't as potentially catastrophic as a GP fault in CLIPSERV or an inability to yield on the DOS side, but they're also not as easy to solve. There are two annoyances you should be aware of when using CLIPSERV.

The first stems from the fact that CMDCLIP and CLIPSERV are two different programs and so may have two different current drives and directories. Any API calls that involve paths will need to specify the *entire* absolute path; relative paths depend on both programs having the same current drive and directory.

Second, I have said that CLIPSERV can give a DOS program access to *any* Windows API function. As currently written, this isn't quite true. Specifically, CLIPSERV doesn't handle Windows functions—such as InterruptRegister()—that expect to have pointers to callback functions passed to them. An improved version of CLIPSERV would need to provide either special-case handling for a few of the more useful functions with callbacks, or it would need a mechanism for calling such functions as the Windows Switch VM and the Callback function (INT 2Fh AX=1685h) in the DOS program's virtual machine. CLIPSERV would need to supply surrogates for these callbacks; in this version, it doesn't.

Similarly, while the DOS program can call SendMessage(), it can't *receive* messages. With the exception of function return values, the communication is one-way. In the event-driven Windows environment, this is a real handicap. On the other hand, if you really want to be writing full-blown, event-driven programs that can receive messages and install callbacks, you should be writing a Windows program, not a hybrid DOS program.

ALTERNATIVE APPROACHES It's debatable whether the Windows Clipboard is the best vehicle for allowing DOS programs to talk to Windows. It serves a useful purpose here because it is the easiest route to take and because it helps to introduce many of the key issues involved in making DOS and Windows programs talk to each other. But the Clipboard certainly isn't the best way to go.

An infinitely superior (but also more difficult) route would be to write a 32-bit Windows virtual device driver (VxD) to manage a queue or pipe that DOS and Windows programs could share. This would involve a third program (a .386 file) in addition to CMDCLIP and CLIPSERV. VxDs can provide their own APIs both to real-mode DOS and to protected-mode Windows programs. A DOS program somewhat like CMDCLIP (you might call it CMDQ) could use the VxD to put requests into a queue rather than into the Clipboard. And a Windows program like CLIPSERV (called QSERV) could get requests from this queue. For

an excellent introduction to using VxDs for precisely this purpose, you should read Thomas W. Olsen's "Making Windows and DOS Programs Talk," in the May, 1992, issue of the *Windows/DOS Developer's Journal*. VxDs really are a crucial aspect of Windows programming.

Note, however, that if you do decide to make a QSERV program that talks to DOS via a queue or pipe in a VxD rather than via the clipboard, much of the code in CLIPSERV can be carried over unchanged. You might decide to pass Windows API calls over in binary form rather than as text, and you might change other things about the program, but many issues would remain the same.

In the course of building the GETCLIP, PUTCLIP, CMDCLIP, and CLIPSERV utilities, I've tried to show you how to access the Windows Clipboard from the DOS box, how to write event-driven message handlers in Windows without using a switch statement, how to use Windows' runtime dynamic linking, and how to catch your own GP faults. In fact, writing CLIPSERV was really an exercise in using various features of Windows to write very generic, general-purpose software. □

ANDREW SCHULMAN IS A WRITER AND ENGINEER AT PHAR LAP SOFTWARE IN CAMBRIDGE, MASSACHUSETTS. HE IS COAUTHOR OF THE BOOK *UNDOCUMENTED DOS* AND OF *UNDOCUMENTED WINDOWS*, FORTHCOMING FROM ADDISON-WESLEY.



The new
ZEOS[®]/SL Notebook
is turning a few heads.



Including its own. And that's just for starters!

ZEOS has taken years of notebook experience and designed the perfect notebook. Feature for feature, there is simply nothing else like it.

And because the new ZEOS/SL is designed and built by ZEOS we can offer it at prices that will send the competition reeling. Maximum features, minimum prices — It's the notebook you've been waiting for.

The new ZEOS®/SL. Read all about it!



Digital brightness and contrast buttons make screen adjustment so easy.

This fine Italian leather carrying case is an additional option. Loaded with pockets and features everyone will appreciate.



This sliding port door won't break off or come loose. Saves your fingers too.



an external VGA color monitor for simultaneous display. Now that's what people want! But that's not all.

A NOTEBOOK KEYBOARD YOU'RE GOING TO LOVE.

Can't someone design a notebook keyboard to be like a desktop keyboard? And while you're at it, be sure to include a pointing device that's easy to use, with three click keys. And how about making sure those cursor keys are *full size* and in the inverted-T format. And all the keys should have good travel and that "just right" ergonomic feel. That was the keyboard wish list.

So we designed it. From scratch. Every key was re-designed and re-sculpted. Even the key-switch mechanism was invented anew. And we added the mouse key for easy cursor control. It is the absolute perfect notebook keyboard. What else?

Lots else! Like the best display system of any notebook available anywhere. We listened here too. The screen is big and easy to read. Plus, it's high contrast and it's fast. It's also very easy to adjust. People said contrast and brightness knobs were hard to use. So we replaced them with soft touch buttons that *electronically* adjust screen settings at your command. Then we really got creative.

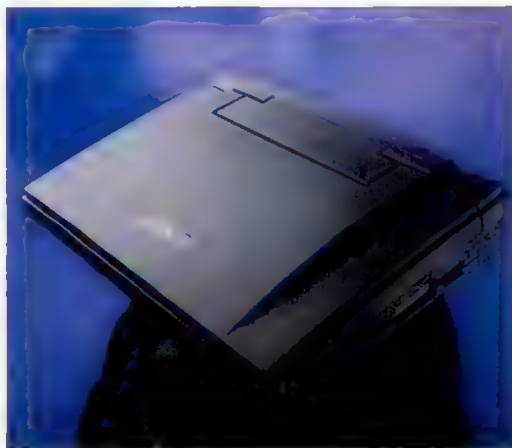
THE ONLY NOTEBOOK WITH A TILT & SWIVEL DISPLAY.

Your new ZEOS Freestyle/SL is the only notebook in the world with a screen that tilts, swivels and floats!

Can you imagine your desktop PC without

a tilt and swivel display? Neither could we. So why not incorporate that feature into a notebook. With the ZEOS Freestyle/SL notebook you can adjust the screen left and right as well as up and down. Now you can truly adjust your notebook screen to the perfect viewing angle.

This comes in handy in other ways as well. It's easy to share data with a person sitting next to you by turning the screen; or if privacy is in order, turn it away so only you can see it. Every frequent flier will appreciate that!



IT FLOATS TOO!

And then there is the "floating" screen. When you're facing your new ZEOS Freestyle/SL, the screen actually appears to "float" in the air in front of you. Adjustable over a wide range of angles, it's the only notebook that can really be used sitting on your lap! Back to our frequent fliers. Because the screen floats on a smaller footprint than normally

hinged screens, you can also use the ZEOS Freestyle/SL without fear of the person in front of you cranking their seat back and doing a "screen crunch" on your system.

Reliability is truly designed in from the ground up in your ZEOS Freestyle/SL. Right down to the port access door. People told us that one of their pet peeves was port access doors falling off competitors' notebooks. Not a problem here. Your industry standard serial, parallel and VGA port connectors are protected by an ingenious sliding door that won't ever fall off.

EXTRA, EXTRA, EXTRAS. READ ALL ABOUT 'EM!

With all its features, we might have stopped

*Measuring only 8.5" x 11.3"
just like a notepad. Easily
fits into a briefcase yet at
5.6 pounds packs all the
wallop of a desktop!*



there. But we didn't. We've made more options available than ever before. Like our 14,400 bps V.32bis, V.42, MNP5™ modem with 14,400 bps send/receive fax. And memory up to 20MB, hard drives to 180MB, even an optional Italian leather carrying case! Extra batteries and a charging stand are available too. Call 800-423-5891 for all the details.

ZEOS.

#1 RATED NOTEBOOKS, SERVICE & SUPPORT!

Your new ZEOS Freestyle/SL is part of the same great ZEOS family of products that has won award after award for quality and service. *PC Magazine* recently surveyed notebook users for their Service and Reliability issue. Their findings? "Only ZEOS portable PCs achieved significantly higher-than-average ratings in all four categories." The categories were reliability, future purchase plans, repair service satisfaction and technical support. And remember, ZEOS technical support is 24 hours a day, 365 days a year, toll free. And we back your new ZEOS Freestyle with our 30-Day Absolute Satisfaction Money-Back Guarantee, One Year Limited Warranty and more.

ORDER YOUR AMAZING ZEOS FREESTYLE/SL NOW!

Ordering your new ZEOS notebook is easy. Simply pick up the phone and give us a call. A friendly ZEOS Systems Consultant is ready to answer any questions you may have. You're going to love your new ZEOS notebook!

CALL NOW TOLL FREE:

800-423-5891

Purchase orders from Fortune 1000 companies, governments and institutions are subject to approval. Leasing programs are available. All prices and specifications are subject to change without notice. Please call to confirm pricing, specifications and warranty details. All products and company names are trademarks or registered trademarks of their respective holders. © 1992, ZEOS International, Ltd., 530 5th Ave. NW, St. Paul, MN 55112 USA. ZEOS is a publicly traded company (NASDAQ symbol: ZEOS). X20-PCM-920929

NEW ZEOS FREESTYLE/SL PACKAGE #1:

ONLY \$1895

- Intel 25MHz 386SL, 64K cache!
- 2MB RAM standard, expandable to 20MB.
- 60MB hard drive, 3.5" floppy.
- Backlit 10" VGA display with Tilt/Swivel base. Simultaneous display with external VGA monitor.
- Snap-in and -out battery packs provide for 3-4 hours of typical operation.
- Quick-charge in little over an hour with the small lightweight AC adapter.
- 8.5" x 11.3", 5.6 lbs., built-in soft carrying handle.
- 81-key keyboard with built-in full-size inverted "T" arrow keys.
- Serial, parallel and VGA ports with standard connectors protected by a durable, easy-to-use sliding door. No more broken doors or broken fingernails!
- 30-Day Money-Back Guarantee, complete ZEOS Customer Satisfaction Package.
- 24-Hour-a-Day Toll-Free Technical Support, 365 Days a Year.

PACKAGE #2:

ONLY \$2495

- 6MB RAM.
- 120MB hard drive.
- Custom carrying case.
- MS-DOS and Windows!

PACKAGE #3:

ONLY \$2995

- 10MB RAM.
- 180MB hard drive.
- Custom carrying case, extra battery, external charging stand.
- MS-DOS and Windows.
- 2400 bps modem with 9600 bps send and receive fax!

ORDER NOW TOLL FREE:

800-423-5891

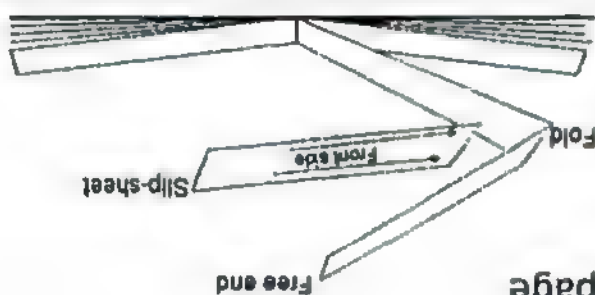
Fax Orders: 612-633-1325
Government: 800-245-2449
Hearing Impaired (TDD)
Orders: 800-228-5389
Outside US and Canada:
612-633-6131
MasterCard, Visa, Discover,
Am Exp, Z-Card.
Open 24 Hours a Day,
365 Days a Year!



ZEOS[®] Freestyle/SL.

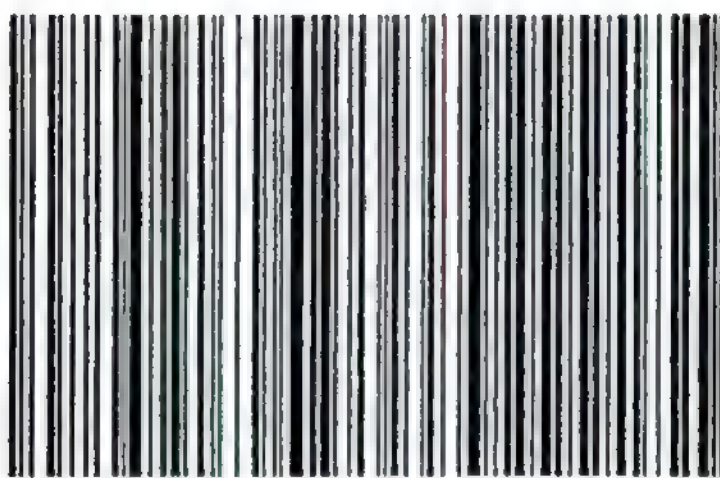
More features at a
lower cost than any
other notebook.

Period.



1. Open the foldout page
2. Insert this sheet with
 1. Front side touching the free page
 2. Arrow pointing to the fold
3. Slice the folded edge
4. Close the page and slip-sheet

Inverted Foldout slip-sheet

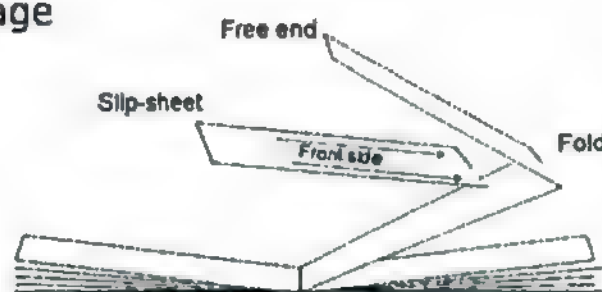


GbsSlipSheet-001

Folded edge of the page

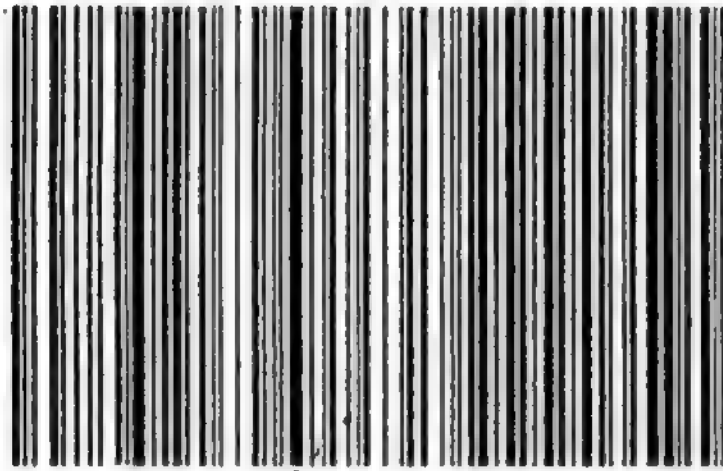
Foldout slip-sheet

1. Open the foldout page
2. Insert this sheet with
 1. Front side touching the free page
 2. Arrow pointing to the fold
3. Slice the folded edge
4. Close the page and slip-sheet



1. Follow instructions on the other side

Inverted Back



Gbs5lipBack-001B

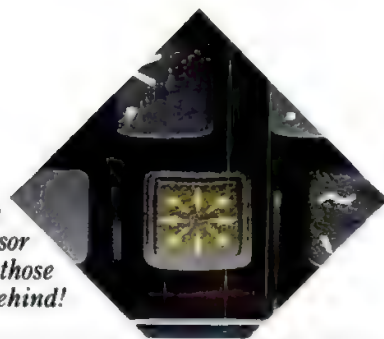
Back

1. Follow instructions on the other side

*The only notebook
with a tilt & swivel
display. Great for
sharing data or
keeping it private.
Easily adjusts for
perfect viewing.*



*Built-in mouse key
provides easy cursor
control. Leave those
bulky mice behind!*



ZEOS® Freestyle/SL 2MB, 60MB Only \$1895

MORE FEATURES AT A LOWER COST THAN ANY OTHER NOTEBOOK. PERIOD.

To try and compare the new ZEOS Freestyle/SL to any other notebook on the market is next to impossible. Because nothing else has all its features. And even with all these great features, nobody can match the price. Features and price. It would seem the new ZEOS Freestyle/SL is the best of all worlds. It is.

DESIGNED BY USERS. JUST LIKE YOU!

That's why we started from scratch. We asked our customers, people just like you, what it is they want in the perfect notebook. The result is perhaps the first truly American notebook. Not designed by some big outfit in a faraway place. But by ZEOS and our customers. We did it together and we think you'll like the results.

The first thing people told us is that most notebooks look like a cigar box with a lid. They told us they wanted more. Not only good looks, but things like great power *and* great battery life. Lightweight too, like five pounds and change. And the display had to be both crystal-clear as well as functional. And the keyboard should be effortless to use. The entire product had to be extremely durable. And that was just for starters.

SL POWER. SL BATTERY LIFE!

We listened well. Then we got down to work. For the chipset and CPU we selected

the Intel 25MHz SL. We then built in a high-speed 64K SRAM cache as standard. We know this system might well replace a desktop for many users.

PC Magazine said the SL chipset is "the way to go" and we agree. The ZEOS Freestyle/SL incorporates the very latest in power-saving features. You can easily go in and out of the various power-saving modes automatically as well as use our "Windows Safe" suspend/resume feature. In addition, the ZEOS/SL features *flash BIOS* enabling you to easily update your BIOS in the future via diskette or modem.

Power to your ZEOS Freestyle/SL system is provided by our advanced battery system. The fully enclosed lightweight battery packs easily snap in and out and can be quick-charged when the system is not being used or trickle-charged when in use. An optional charging stand is also available. You're also going to like our super-small AC adapter—it can fit in a shirt pocket and weighs only ounces. So what happens when the power is on?

GREAT VIDEO TOO!

You get great video! Because for video control, we chose the amazing new Cirrus Logic VGA controller. Also made especially for notebooks, it not only consumes less power, it also produces the fast crisp images you're looking for. And with a business machine like this you'll also appreciate our dual display capabilities. You can connect



"Only ZEOS's portable PCs achieved significantly higher-than-average ratings in all four categories." – PC Magazine, Service and Reliability issue, May 26, 1992

ZEOS[®] Notebooks #1 Again!

Get the ZEOS Advantage.
24 hours a day, 365 days a year.

800-423-5891

Circle 152 on reader service card.



**Overall
PC reliability**



**Future
likelihood of
buying from
the vendor**



**Satisfaction
with repair service**



**Satisfaction
with technical
support**



Programming

ENVIRONMENTS

MCI, MIDI, and The Nature of Time

BY CHARLES PETZOLD

The Musical Instrument Digital Interface (MIDI) started out as a protocol for connecting electronic musical devices to computers. Of course, people eventually wanted to store music compositions in files, and several years ago a standard file format for MIDI was devised. The standard is currently maintained by the International MIDI Association (IMA).

Standard MIDI files are an important data format in any type of multimedia system. Fortunately, the Multimedia Extensions to Microsoft Windows (included in Windows 3.1) provide high-level support for MIDI files. Using a few Media Control Interface (MCI) commands, you can play a MIDI file containing anything from a single phrase of music to an entire composition.

MIDI files are to audio waveform files as graphics metafiles are to bitmaps. (See the February 11, 1992, Environments column for a discussion of audio waveform files.) Just as a bitmap stores a representation of a real-world image, an audio waveform file stores a representation of a real-world sound. Each requires lots of storage space depending on the resolution of the image or sound.

A MIDI file is more like a graphics metafile. Metafiles and MIDI files are machine- or human-generated. Just as a metafile stores a collection of high-level drawing commands, a MIDI file stores a collection of MIDI messages to control a synthesizer. Metafiles and MIDI files are usually much smaller than bitmaps or waveform audio files, and their contents can be edited. The results of "playing" either a metafile or a MIDI file depend on the quality of the output device—a

video display or printer in the case of a metafile, and an electronic music synthesizer in the case of a MIDI file.

STANDARDS AND NON-STANDARDS By convention, MIDI files under DOS have an extension of .MID. The retail release of Windows 3.1 includes a MIDI file suitable for playing under the Windows 3.1 Media Player. Although I haven't encountered any examples yet, MIDI

*If you want to really
know what you're doing
when you use MCI to play
a MIDI file, you have to
understand something
about MIDI files.*

files for Multimedia Windows can also have the extension .RMI. This is a MIDI file in the Resource Interchange File Format (RIFF), and is essentially a standard MIDI file enclosed in a RIFF.

Although MIDI and MIDI files are important standards for computer-assisted electronic music, we've seen in past columns that the standard goes only so far. The big problem results from the Program Change MIDI message, which selects an instrument voice on the synthesizer based on a seven-bit code. Different synthesizers assign different instrument voices to these codes.

If you cruise the data libraries in the MIDI forum on CompuServe, you'll find lots of .MID files. The files are very often targeted for a particular brand of synthesizer (such as the Roland MT-32). Gener-

ally, you can play these files on other synthesizers, but the instruments will be wrong.

In an attempt to rectify the problem, the MIDI Manufacturers Association has defined the General MIDI Mode, which standardizes the instrument voice mappings. As I've noted previously, Multimedia Windows adheres to these mappings and provides the MIDI mapper utility to help with synthesizers that don't follow the standard. But there's a catch: In order to accommodate low-cost synthesizers, Multimedia Windows defines two types of synthesizers, base-level and extended. MIDI channels 1 through 10 are used for extended synthesizers, channels 13 through 16 for base-level synthesizers.

In order to be playable on both base-level and extended synthesizers, a MIDI file for Multimedia Windows must contain two complete renditions of the same composition—one using channels 1 through 10 and the other using channels 13 through 16.

MCI AND MIDI FILES If you look at the documentation for the Media Control Interface as it relates to MIDI files, you'll discover that many commands are documented with a statement like: "The MCISEQ sequencer does not support this option." This is a reference to MCISEQ.DRV, the device driver that handles the MCI commands for MIDI.

MCISEQ's biggest drawback is that it cannot record MIDI messages coming from a keyboard (or other MIDI controller) into the MIDI In port of a multimedia PC. MCISEQ is a play-only device. To create a MIDI file, you'll need MIDI sequencing software. (Several such programs for DOS and Windows were reviewed in the article "MIDI Goes Mainstream" in the March 31, 1992, issue of

PC Magazine). After you get over that disappointment, further exploration of the current MCI support for MIDI turns up some very odd stuff. You'll encounter terms such as division type, time format, song pointer, and drop frame, and abbreviations like PPQN and SMPTE. What are these things?

It turns out that if you want to really know what you're doing when you use MCI to play a MIDI file, you have to understand something about these files. That's what I'll focus on in this column.

THE BASICS OF MIDI FILES While I don't want to get into the bits and bytes of the MIDI file format here (that will be a later column), it will help to become familiar with the general contents of a MIDI file.

MIDI files use a tagged format with chunks of information. But there are only two types of chunks: a small (6 bytes) header chunk at the beginning of the file, and one or more *track chunks*. The track chunks contain the actual MIDI data. Excluding some overhead, the information in a MIDI file can be separated into four categories:

- The header information appears at the beginning of the file and indicates the MIDI file type, the number of track chunks, and the way delta times (discussed shortly) are interpreted.
- MIDI messages appear in the track chunks and are sent by the MIDI file player to the synthesizer to play the composition. But you don't want all the messages sent at once. The result would sound like a mess and the composition would be over very quickly! For that reason, all MIDI messages in the file are preceded by delta times.
- *Delta times* are numeric values that tell the MIDI file player how long to wait between sending two consecutive MIDI messages to the synthesizer. Delta times can be zero if two or more messages are to be sent without any delay (to play a chord, for example). You're probably wondering what units of time are used. Well, it's a little complex but I'll get to it shortly.
- *Meta-events* are formatted similarly to MIDI system-exclusive messages. They give the MIDI file player textual information about the file and the composition, and also specify important control information such as tempo.

After you've become familiar with MIDI messages, the most daunting aspect of MIDI files is dealing with tempo and time.

THE RUDIMENTS OF TEMPO In traditional Western music notation, relative durations of notes are indicated symbolically. A whole note (an open oval) is twice as long as a half note (a closed oval), which is twice as long as a quarter note (an oval with a vertical stem), which is twice as long as an eighth note (a flag added to the stem), and so forth. Sixteenth notes, thirty-second notes, and sixty-fourth notes have additional flags

*After you've become
familiar with MIDI
messages, the most
daunting aspect of MIDI
files is dealing with tempo
and time.*

on the stems. A triplet is indicated by three connected notes with a numeral 3 nearby. For example, three eighth notes connected in a triplet are intended to be played for the same duration as a quarter note.

While this notation indicates the relative durations of the note, it says nothing about absolute times. For a long period in the history of Western music, the overall tempo (or speed) of a composition was not quite as precise. Sometimes tempo was left to the performer, or indicated by words such as *adagio*, *andante*, and *allegro*.

With the invention of the metronome in 1816, composers had a more precise alternative. A metronome is calibrated in beats per minute and makes a steady clicking beat whose speed can be altered. A metronome marking can then be noted on the composition like this:

$\text{♩} = 120$

In this case, the piece should be played with 120 quarter notes per minute, or two quarter notes per second. Thus, a quarter note is a half second long, a half note is

one second long, and an eighth note is a quarter second long.

Of course, tempos can change during a composition. Sometimes the change is immediate, sometimes it's gradual. A gradual increase in tempo is called an *accelerando*, a gradual decrease, a *ritardando*.

HOW TO TELL TIME Obviously, the delta times in a MIDI file have something to do with relative note durations and something to do with tempo. For example, if the tempo of a composition is 120 quarter notes per second, and if delta times are specified in milliseconds, a sequence of quarter notes would have delta times of 500 and a sequence of eighth notes would have delta times of 250.

Although it's possible to specify delta times in milliseconds, that's not the norm; it would put too much absolute timing information in the file. Instead, delta times in a MIDI file are specified as fractions (called *parts* or *divisions*) of some fixed duration. This is known as the *division type* and is specified in the header section of the MIDI file.

You can use MCI to determine the division type of a MIDI file. If you use the text-based form of MCI, the division type will be identified by one of the following character strings:

PPQN
SMPTE 24 Frame
SMPTE 25 Frame
SMPTE 30 Drop Frame
SMPTE 30 Frame

The division type applies to the entire MIDI file. By far the most common division type you'll encounter in MIDI files is *PPQN*, which stands for "parts per quarter note."

In a PPQN file, a number in the file header specifies the delta time for a quarter note. This is called the *division value*, and it applies to the entire file. Generally, a division value is chosen that contains several factors of 2 and at least one factor of 3. Common division values are 72, 96, 120, and 240.

A division value of 96 means that a sequence of quarter notes would be separated by delta times of 96. A sequence of eighth notes would be separated by delta times of 48. A triplet of sixteenth notes would be played in the

same time duration as a single eighth note, so the notes would be separated by delta times of 16. Triplets are the reason that division values often contain a factor of 3.

Thus, the method of expressing durations in a PPQN file is a numerical analogue of traditional notation. These delta times are relative, of course, but to convert to actual times, all we need is a tempo.

By default, MIDI files are assumed to have a tempo of 120 quarter notes per minute. The file can contain meta-events that specify different tempos, however, and there can be multiple tempo meta-events to change the tempo of the composition as it's playing. The tempo meta-event specifies tempo as microseconds per quarter note. (The default tempo is 500,000 microseconds, or a half second, per quarter note.)

Thus, when playing the MIDI file, MCI can convert a delta time to a millisecond duration with the formula:

$$\text{Duration} = \frac{\text{Tempo}}{1000} * \frac{\text{Delta-Time}}{\text{Division}}$$

The values on the right side of the equal sign come from various sources: The division value is specified in the file header, the tempo in microseconds per quarter note is specified in a meta-event, and the delta time (relative to the division value) precedes each MIDI message in the file.

When using MCI with MIDI, you can determine the current tempo of the file that's being played. For files based on PPQN divisions, MCI converts the tempo to quarter notes per minute, which is the more traditional representation. This is not a very difficult calculation for MCI. It's simply:

$$\text{MCI Tempo} = \frac{60,000,000}{\text{MIDI Tempo}}$$

The MIDI Tempo is in units of microseconds per quarter note. Dividing this value into the numerator (the number of microseconds in one minute) converts the tempo to quarter notes per minute.

One of the few things that MCI allows you to do while playing a MIDI file is change the tempo. In this case, you also

specify the tempo in quarter notes per minute. Using MCI, you can change the tempo dynamically as a file is being played, to speed it up or slow it down.

SMPTE TIME CODE The second format for specifying time durations in a MIDI file is based on SMPTE (pronounced seh-m-tee). SMPTE stands for the Society of Motion Picture and Television Engineers, but often refers to a time code used for movies and television.

This may come as a shock, but in order to understand SMPTE-based MIDI files, you're going to have to learn something about video. Here goes.

As we all know, both movies and TV work by displaying a sequence of still pictures at a rate fast enough for the human eye and mind to blend them into movement. Each of the still pictures is called a *frame*. A SMPTE time code basically specifies time in units of hours, minutes, seconds, and frames.

The SMPTE time code has become most crucial in editing videotape, which is almost always computer-assisted nowadays. In videotape editing, for example, SMPTE time codes are stored on an auxiliary audio track of the video (which the computer hardware can read) and are also often superimposed on a window of the video image (for the human editor). Since each frame of the videotape has a unique SMPTE time code, edit lists can be constructed for frame-accurate editing.

Because MIDI is sometimes used for music to accompany movies and video presentations, specifying MIDI time durations in SMPTE units is very useful for synchronizing the music with the picture. Using special hardware and software, the playing of the MIDI file can be slaved to a time code recorded on a videotape.

The common notation for representing a SMPTE time-code is:

hh:mm:ss:ff

The hh field is the hour, which can range from 0 to 23. The mm and ss fields are the minutes and seconds, which can range from 0 to 59. The ff field is the frame, which can range from 0 to . . . well, it depends. There are actually four different SMPTE time-code formats in common use, and any of them can be used in MIDI files.

Motion picture film uses 24 frames per second. This is the SMPTE 24 format, and the ff field in the SMPTE time code can range from 0 to 23. That's the easy one. The other three formats apply to television and videotape. Originally, the frame rate of television signals was based on the alternating current rate, a convenient source for generating a timing rate for video cameras. But today, video cameras use crystals for timing purposes.

Because the European alternating current is 50 cycles per second, the frame rate is 25 frames per second. This is the standard for the PAL and SECAM television systems used throughout Europe, Africa, and much of Asia. The ff field of the SMPTE 25 time-code ranges from 0 to 24.

In the United States, alternating current is 60 cycles per second and American TV was originally broadcast at 30 frames per second. That's the origin of the SMPTE 30 time code, in which the ff field ranges from 0 to 29.

But in 1953 the NTSC (National Television Standards Committee) set the American frame rate 0.1% slower, approximately 29.97 frames per second, in order to avoid interference in the color sub-carrier part of the television signal. The NTSC standard is used in North America, much of South America, and parts of the Far East, including Japan.

That 0.1% difference seems pretty slight, and you might assume you can ignore it. But if you compose MIDI music for a one-hour video program assuming 30 frames per second and then attempt to synchronize the music to the video, the music will run 3.6 seconds too long. You won't hear the last chord because a commercial will already be on!

So we have a problem. The format of the SMPTE time code depends on an integral number of frames per second, but NTSC color TV has 29.97 frames per second. What do you do?

Invent something called a *drop frame* time code. A drop frame is very much like leap year. Each SMPTE second usually contains 30 frames, except every so often a SMPTE second contains 28 frames. Specifically, this happens at the beginning of every minute, except at the beginning of every tenth minute. The SMPTE time-code counter simply skips frames 0 and 1 when incrementing the minute, ex-

cept when incrementing a tenth minute.

If you work out the math, everything comes out okay: Every 10 minutes (or 600 seconds) of NTSC video contains 17,982 frames. In the SMPTE time code signal, 591 of these seconds have 30 frames and 9 of the seconds have 28 frames. Of course, the actual frame rate of the video is a constant 29.97. But a little fiddling with the time code allows minutes and hours of video to be accurately counted.

The SMPTE 30 drop frame time code is used only when accurate timing is necessary. Otherwise, for simplicity, SMPTE 30 is used when working with NTSC video.

MIDI files can be based on any of these four SMPTE time codes, and the time code is indicated in the header section of the file. The header section also includes a division value that indicates the division of a frame. A division value of 80 is often used because SMPTE time codes sometimes separate a frame into 80 "bits" (not related to computer bits). Delta times are then relative to this division value.

Let's assume we're dealing with a SMPTE 30 file with a division value of 80. A delta time of 80 would be the time required for one frame, or $1/30$ second. A delta time of 2,400 would be one second. For a SMPTE 25 file with a division of 80, this same delta time of 2,400 would represent 30 frames, or 1.2 seconds.

To create a MIDI file with delta times specified in units of milliseconds, you can use the SMPTE 25 format with a division value of 40. A delta time of 40 would correspond to one frame (or 40 milliseconds) and a delta time of 1,000 would correspond to 25 frames (or one second).

Because a SMPTE-based file is usually created for synchronization with film or video, it generally will not contain a tempo meta-event. Changes in tempo would be reflected in differing delta times. When you use MCI to interrogate the tempo of a SMPTE-based MIDI file, it will report the number of frames per second, either 24, 25, or 30.

THE MCI TIME FORMAT You can also use MCI to determine the length of the composition encoded in a MIDI file, to determine the current position in a MIDI file that's playing, or to play a MIDI file from one specified position to another. These lengths and positions can be in one

of five different formats, called the *time* formats.

For PPQN files, the default time format is called the *song pointer*, which is in units of sixteenth notes. Thus, the duration of the composition would be the number of sixteenth notes it contains, independent of tempo. It's simply the sum of the delta times in the file divided by the division value (which would yield the number of quarter notes in the composition); the result is then multiplied by 4.

As I've discovered, the song pointer is a wonderful convention for synchronizing animation to the music in a MIDI file. The synchronization can be pegged to sections of the music rather than absolute time. Then, changing the tempo doesn't affect the synchronization of the animation: It simply runs faster or slower.

*The song pointer is
a wonderful convention
for synchronizing
animation to the music
in a MIDI file.*

For SMPTE-based files, the default time format is the SMPTE time code used for the file, which makes a lot of sense.

Using MCI commands, you can change the time format. Subsequent MCI commands to obtain the length of the composition, or to obtain or set the current position, will then be in units of the new time format.

You can set the time format to milliseconds, any of the four SMPTE time codes, or the song pointer, with one exception: You cannot specify a song pointer time format with a SMPTE-based MIDI file, because SMPTE-based MIDI files know nothing about quarter notes or eighth notes. All the other time formats are based on real time, however, so they are easily convertible.

TEMPO, POSITION, DURATION Now it's time to discuss a few other oddities in the way MCI uses MIDI files. These are generally related to the interrelationship between tempo, the duration of a MIDI file, and the current position. If you use MCI to double the tempo, for example, the

composition will play in half the time. How is this reflected in the duration and the current position?

In a PPQN file, the duration and current position are based on the division value, the delta times, and tempo meta-events in the file. (The tempo meta-events don't affect the song pointer format.) Changing the tempo with MCI does not affect the values of duration and current position you obtain or set using MCI. A MIDI file that plays a four-minute composition will always be reported as having a four-minute duration, even if you use MCI to double the tempo and the file plays in two minutes.

In a SMPTE file, the duration and current position are based on the SMPTE frame rate, the division value, and the delta times. As I mentioned earlier, SMPTE files will usually not contain tempo meta-events, since the whole purpose of using a SMPTE file is for synchronization.

In reality, though, SMPTE files can contain tempo meta-events, in which case the tempo is specified in microseconds per frame. A SMPTE 25 file has a default tempo of 40,000 microseconds per frame. If a tempo meta-event that specifies 20,000 microseconds per frame is added to the file, the composition will play twice as fast. The duration and position information, however, would still be specified as if the tempo meta-event were not present in the file.

If a SMPTE 25 file contains a tempo meta-event (for example, 20,000 microseconds per frame), then MCI will report the tempo not as 25 frames per second, but as 50 frames per second. I know this doesn't make much sense, but that's what happens.

You can also use MCI to set the tempo of a SMPTE-based file. If you have a SMPTE 25 file and set the tempo to 25 frames per second, the file will play as if no tempo meta-events were present in the file.

PUTTING IT INTO PRACTICE Now that we have some basic concepts of MCI and MIDI files nailed down, we can put MCI to work with a program that plays MIDI files. The program I'll present in the next issue is somewhat like the Media Player program included in Windows 3.1, but mine also allows you to change the tempo. Watch for it. □

POWER PROGRAMMING

The Windows 3.1 ToolHelpDLL, Part 3

BY RAY DUNCAN

For the last two columns, we've been looking at Windows 3.1's TOOLHELP.DLL, a dynamic link library that gives you access to previously undocumented Windows data structures and function calls. Two sample programs described in the August 1992 issue—BADAPP and BADAPP2—showed how to implement a notification callback routine that will be called by TOOLHELP if your program makes a function call with an invalid parameter. SYSMON, published in the September 15, 1992, issue, demonstrated how to use the TOOLHELP functions to walk the system module list, task list, window class list, and global heap.

In this installment, we'll examine the TOOLHELP functions that let your program intercept certain interrupts—such as divide by zero, general protection (GP) fault, breakpoint, and invalid opcode—in a “well-behaved” manner. The ability to capture and service these interrupts is vital for anyone who wants to write a Windows-based debugger, but it's also handy if you're writing any sort of high-level language interpreter or even an application with a built-in macro language. Any time you place a programming facility—especially one that supports pointers—in the hands of an end-user, you can no longer hope to test your application exhaustively, so you must fight back with robust error handling.

INTERRUPTS AND THEIR KIN As every English schoolboy knows, the Intel 80x86 family of processors supports 256 levels of interrupts. The location of the interrupt service routine (ISR), or interrupt handler, for each interrupt is specified in a RAM-based table that is created and updated by software and interpreted by

hardware. In real mode, the table is called the interrupt vector table; it is always located at address 0000:0000 and consists of 256 far pointers, or 1,024 bytes. In protected mode, on the other hand, the table is called the Interrupt Descriptor Table (IDT). An IDT is more complex than a real-mode vector table, it can be located anywhere in memory, and it can be maintained on a per-task basis. When an inter-

*Our examination of
ToolHelp continues with
a look at the functions
that let applications
intercept interrupts in a
well-behaved manner.*

rupt occurs, the CPU is hardwired to push the current contents of the CPU flags and instruction pointer (CS:IP) onto the stack, fetch the address of the interrupt handler from the appropriate table according to the current execution mode, and load that address into the instruction pointer. When the handler routine is finished, it executes an interrupt return (IRET) instruction, and execution resumes at the point of interrupt.

So far, so good. But this explanation doesn't take into account that there are two basic classes of interrupts. *External* interrupts are the kind we generally think of when we hear the word interrupt: they are generated by adapter cards, clock chips, and other gizmos located outside the CPU chip. These devices usually interrupt the CPU by signaling it through

the INTR pin; if the CPU accepts the interrupt by a pulse on the “interrupt acknowledge” (INTA) pin, the external device tells the CPU which interrupt handler to use by jamming a number in the range 0 to 255 onto the CPU's data bus. (There is also a nonmaskable interrupt pin, NMI, which we'll ignore here.)

In real mode, a program can mask—or block the reception of—external interrupts by executing the DI (disable interrupts) instruction, and can unmask interrupts by executing the EI (enable interrupts) instruction. In protected mode, execution of EI and DI is mostly reserved for the operating system and its device drivers, though certain protected mode applications with I/O privilege level (IOPL) may also be allowed to execute the instructions, and real mode applications running in a Virtual 86 machine will get special treatment.

Internal interrupts, on the other hand, are triggered by events inside the CPU—the execution of an instruction, or an error condition that arises during the execution of an instruction. The one we're all familiar with is the INT instruction, which can be used in real mode to force the occurrence of any of the 256 possible interrupts. MS-DOS uses INT as its application program interface mechanism: When DOS boots up, it puts the address of its entry point into slot 21h of the interrupt vector table, and programs request services from DOS by loading various parameters into registers and then executing an INT 21h instruction to transfer control to DOS's function dispatcher.

The neatest thing about the INT instruction, aside from its use as a sort of compact FAR CALL instruction, is that it makes the initial testing of handlers for external interrupts much easier: You can

Power Programming

write and install the handler, then drive it with a small test program that executes the appropriate INT instruction under a variety of conditions, even if the external hardware that will ultimately generate the interrupt has not yet been built.

But there's a lot more to internal interrupts than the INT instruction. There's the special 1-byte debugger breakpoint opcode, 0CCh, which always generates an interrupt 3. There's interrupt 1, the single-step interrupt also designed especially for use by debuggers. And finally, there's the whole host of interrupts (known by the specific technical term *exceptions*) listed in Figure 1 that occur when a program tries to execute an instruction with the wrong parameters or an instruction it isn't entitled to use.

Most of these exceptions are of interest only to the authors of protected mode operating systems, and their implementation varies from one model of the Intel 80x86 series to another. When they occur in the context of an application program, the operating system's response is usually to terminate the application with extreme prejudice and put a discouraging message up on the screen to let the user know he just lost all his work. For a more detailed explanation, consult *Programming the 80386* by Crawford and Gelsinger (Sybex Inc., 1987), or *Programmer's Reference Manual: The Processor and Coprocessor* by Robert Hummel (Ziff-Davis Press, 1992). Note that exceptions are further subdivided into two groups: faults and

traps. The distinction between the two is essentially that faulting instructions are restartable; trapping instructions are not.

When an instruction faults, the error condition is detected by the CPU before any part of the instruction executes, and the address of the "bad" instruction itself is pushed onto the stack. This gives the interrupt handler the opportunity to recover from the error condition: It can retrieve the address of the faulting instruction from the stack, decode the instruction type, examine the registers or memory being accessed by the instruction, make any changes that are necessary, and, finally, restart execution of the failed instruction by executing an IRET. At the least, the handler for a fault exception can gather and display very detailed diagnostic information. In contrast, a trap exception isn't detected until after the error has occurred, and the CPU pushes the address of the instruction after the failed instruction onto the stack. Because Intel 80x86 instructions have varying lengths, and the trapped instruction may have already changed registers and/or memory, recovering from a trap exception would be a nasty proposition. Fortunately, most Intel 80x86 exceptions are faults.

HANDLING FAULTS TOOLHELP.DLL provides applications with access to a subset of the possible exceptions: interrupts 0, 1, 3, 6, 12, 13, and 14. For most applications, only two are worrisome: Interrupt 0 (divide by zero) and Interrupt 13 (general protection fault). Interrupt 0 is triggered if your program executes either a division by zero operation or a division that results in an overflow; that is, the quotient will not fit into the destination register. Interrupt 13 is triggered by a wide variety of conditions, the most common of which are use of an invalid selector (such as dereferencing an uninitialized or NULL far pointer) or using a valid selector but an offset that lies outside the designated segment's "limit" (which is from 1 to 65536 bytes).

The framework for application exception handling with TOOLHELP is quite similar to the technique we used for the handling of parameter validation errors in BADAPP2.C:

- The program must contain a callback routine, which is entered from TOOLHELP when an exception is detected.
- The callback routine must be

"exported" in the program's .DEF file.

- The initialization code for the application must allocate a thunk for the callback routine with MakeProcInstance(), and register the callback with TOOLHELP by calling InterruptRegister().
- The termination code for the application must notify TOOLHELP that it no longer wants to handle exceptions by calling InterruptUnRegister(), and then free the callback thunk by calling FreeProcInstance().

When the application's callback routine is entered, information about the cause of the exception is available on the stack (Figure 2). The state of all general registers at entry is indeterminate, except that AX has been loaded by the thunk code with the selector for the application's DGROUP. After examining the stack, the callback routine can take one of four possible actions:

- Indicate that it doesn't want to handle the exception by executing a RETF instruction; the exception will then be processed by the next handler on the chain (usually TOOLHELP itself).
- Fix the cause of the fault, discard the first 10 bytes of the stack, and execute an IRET instruction to restart execution of the faulted instruction.
- Call TerminateApp() to kill the faulting application.
- Retain control by initializing all general and segment registers to valid values and then branching to an error-handling routine in the application, never executing a RETF or IRET.

Due to the design of the TOOLHELP interface, some of this is tough to implement in a high-level language, so Win-

Exceptions

Interrupt	Description
0	Divide by zero
4	Overflow
5	BOUND range exceeded
6	Invalid opcode
7	Coprocessor not available
8	Double-fault
9	Coprocessor segment overrun
10 (0Ah)	Invalid task segment
11 (0Bh)	Segment not present
12 (0Ch)	Stack fault
13 (0Dh)	General protection fault
14 (0Eh)	Page fault
16 (10h)	Coprocessor error
17 (11h)	Alignment check

Figure 1: These interrupts, known as exceptions, occur when a program tries to execute invalid instructions.

The Stack After an Exception

. (application's stack)	
.	
Flags (fault)	SP+0EH
CS (fault)	SP+0CH
IP (fault)	SP+0AH
TOOLHELP handle (internal)	SP+08H
Interrupt Number	SP+06H
AX (at point of fault)	SP+04H
CS (TOOLHELP)	SP+02H
IP (TOOLHELP)	SP+00H

Figure 2: This shows the stack contents at entry to an application interrupt callback routine.

PROGRAMMING

Power Programming

dows application interrupt callbacks are typically written either entirely in assembly language or as an assembly language stub that in turn calls a C routine to do the body of the work.

And now we must turn to the truly horrid aspect of the TOOLHELP interface. Because Windows does not take full

advantage of the Intel 80x86 protection architecture and runs all applications on the same Local Descriptor Table (LDT), Windows has no way to dispatch exceptions on a per-application basis. As a result, when your application registers an interrupt callback routine, that routine will receive callbacks for all exceptions

that occur in the system—whether or not your own application caused them. This means that your application must maintain internal flags that can be tested by the callback to determine whether the exception should be handled or ignored, and update these flags each time the application gains or yields control of the

BADAPP3.C

Partial Listing



```
// BADAPP3 - Application Error Testbed for Windows 3.1 with Notification
// Callback and GP Fault/Divide by Zero Interrupt Handlers
// Copyright (C) 1992 Ray Duncan
// Ziff Davis Publishing • PC Magazine
```

```
#define dim(x) (sizeof(x) / sizeof(x[0])) // returns no. of elements
```

```
#include "windows.h"
#include "toolhelp.h"
#include "badapp.h"
```

```
HANDLE hInst; // module instance handle
HWND hFrame; // handle for frame window
WNDPROC lpNotifyCallback; // NotifyCallback thunk addr
WNDPROC lpIntCallback; // IntCallback thunk addr
```

```
UINT ActiveFlag = FALSE; // TRUE when handler active
CATCHBUF CatchBuf; // holds Catch() state
LPCATCHBUF lpCatchBuf = &CatchBuf; // far pointer for Throw()
UINT IntNum; // interrupt number
LPCVOID lpFault; // address of fault
```

```
char szShortAppName[] = "BadApp"; // short application name
char szAppName[] = "BadApp - UAE Tester"; // long application name
char szMenuName[] = "BadAppMenu"; // name of menu resource
char szIconName[] = "BadAppIcon"; // name of icon resource
```

```
struct decodeWord { // structure associates
    UINT Code; // messages or menu IDs
    LONG (*Fxn)(HWND, UINT, WPARAM, LPARAM); // with a function
};
```

```
// Table of window messages supported by FrameWndProc()
// and the functions which correspond to each message.
```

```
struct decodeWord messages[] = {
    WM_NOTIFY, DoNotifyMessage,
    WM_PAINT, DoPaint,
    WM_COMMAND, DoCommand,
    WM_DESTROY, DoDestroy, };
```

```
// Table of menu item IDs and their corresponding functions.
```

```
struct decodeWord menuItems[] = {
    IDM_EXIT, DoMenuExit,
    IDM_GPF, DoMenuGPF,
    IDM_HANG, DoMenuHang,
    IDM_ZERODIV, DoMenuZeroDiv,
    IDM_BADWDC, DoMenuBadWDC,
    IDM_BADPTR, DoMenuBadPtr, };
```

```
// WinMain() omitted here - same as BADAPP2
```

```
// InitInstance --- instance initialization code for this application.
```

```
BOOL InitInstance(HANDLE hInstance, int nCmdShow)
```

```
{
    hFrame = CreateWindow(
        szShortAppName, // create frame window
        szAppName, // window class name
        WS_OVERLAPPEDWINDOW, // text for title bar
        CW_USEDEFAULT, CW_USEDEFAULT, // default position
        CW_USEDEFAULT, CW_USEDEFAULT, // default size
        NULL, // no parent window
        NULL, // use class default menu
        hInstance, // window owner
        NULL); // unused pointer

    if(!hFrame) return(FALSE); // error, can't create window

    ShowWindow(hFrame, nCmdShow); // make frame window visible
    UpdateWindow(hFrame); // force WM_PAINT message
```

```
// allocate private message numbers for use by callbacks
messages[0].Code = RegisterWindowMessage("BADAPP_NOTIFY");
messages[1].Code = RegisterWindowMessage("BADAPP_INTERRUPT");
```

```
// allocate thunks for callbacks
lpNotifyCallback = MakeProcInstance((WNDPROC) NotifyCallback, hInst);
lpIntCallback = MakeProcInstance((WNDPROC) ISR, hInst);
```

```
// register parameter validation and interrupt callbacks
NotifyRegister(NULL, lpNotifyCallback, NF_NORMAL);
InterruptRegister(NULL, lpIntCallback);
```

```
return(TRUE); // return success flag
```

```
// TerminateInstance --- instance termination code for this application.
```

```
BOOL TerminateInstance(HANDLE hInstance)
```

```
{
    NotifyUnRegister(NULL); // free validation callback
    InterruptUnRegister(NULL); // free interrupt callback
    FreeProcInstance(lpNotifyCallback); // release callback thunks
    FreeProcInstance(lpIntCallback);
    return(TRUE); // return success flag
}
```

```
// FrameWndProc --- callback function for application frame window.
```

```
LONG FAR APIENTRY FrameWndProc(HWND hWnd, UINT wMsg, WPARAM wParam, LPARAM lParam)
```

```
{
    int i; // scratch variables
    long l;
```

```
ActiveFlag = TRUE; // turn on exception handling
```

```
if(Catch(lpCatchBuf)) // save context, etc...
```

```
{
    // if regaining control from Throw(), exception occurred during
    // message handling. Send exception message, turn off exception
    // handling, and pass message to default handler.
    PostMessage(hWnd, messages[1].Code, 0, 0);
    ActiveFlag = FALSE;
    return(DefWindowProc(hWnd, wMsg, wParam, lParam));
}
```

```
for(i = 0; i < dim(messages); i++) // decode window message and
```

```
{
    if(wMsg == messages[i].Code) // run corresponding function
```

```
{
    l = (*messages[i].Fxn)(hWnd, wMsg, wParam, lParam);
    ActiveFlag = FALSE; // turn off exception handling
    return(l); // return message result
}
```

```
// if no match in messages[] table, turn off exception handling
```

```
and pass message to default message handler
```

```
ActiveFlag = FALSE;
```

```
return(DefWindowProc(hWnd, wMsg, wParam, lParam));
```

```
// DoCommand(), DoPaint(), and various routines
```

```
// omitted here - see BADAPP and BADAPP2
```

```
// DoIntMessage --- process private message from interrupt handler
```

```
LONG DoIntMessage(HWND hWnd, UINT wMsg, WPARAM wParam, LPARAM lParam)
```

```
{
    char temp[256]; // formatting buffer
```

```
// format and display interrupt number and fault address
```

```
wprintf(temp, "Interrupt %02Xh at %04Xh", IntNum,
```

```
HIWORD(lpFault), LOWORD(lpFault));
```

```
MessageBox(hWnd, temp, "BadApp", MB_OK | MB_ICONEXCLAMATION);
```

```
return(FALSE);
```

```
// InterruptCallback --- callback routine for faults & exceptions.
```

```
// Entered from "umbrella interrupt handler" in ISR.ASM. Restores
```

```
// execution context to that saved in the latest call to Catch().
```

```
VOID FAR APIENTRY InterruptCallback(UINT Num, LPCVOID Addr)
```

```
{
    IntNum = Num; // save interrupt number
```

```
lpFault = Addr; // and fault address
```

```
Throw(lpCatchBuf, 1); // then restore old context
```

Figure 3: Extracts from BADAPP3.C showing the portions concerned with exception handling. The full source code can be downloaded from PC MagNet.

CPU. This becomes a major maintenance problem in a hurry, particularly for complex applications that are implemented as a suite of discrete tasks communicating via DDE or SendMessage().

AN EXAMPLE To illustrate the fundamental steps involved with TOOLHELP-based application exception handling under Windows, I've modified BADAPP2 to create a new program—BADAPP3—that includes an interrupt callback routine. From a user's point of view, BADAPP3 looks just like BADAPP and BADAPP2, except that when the user picks GP Fault, Divide by Zero, or Pass Bad Pointer on the Crash pop-up menu, he sees a diagnostic dialog box that originates in BADAPP3, rather than one displayed by Dr. Watson or the Windows kernel. And BADAPP3 cannot be terminated unilaterally by the operating system. Extracts from the source code for BADAPP3 that are relevant to the handling of exceptions are shown in Figure 3, and the assembly language source code for the callback stub is shown in Figure 4. A screen shot of BADAPP3 in action is shown in Figure 5. You can download the complete source code for BADAPP3, along with the precompiled executable program (archived as BADAPP3.ZIP) from PC MagNet.

The overall structure of BADAPP3 is table-driven and straightforward, but there are two areas to note. The first is the method by which we keep control and restore the CPU to a known state when our callback routine is called because of a divide by zero or general protection fault that occurred in our application. When the callback is entered from TOOLHELP, we can figure out where the fault occurred easily enough, but the register contents and especially the depth of the stack are unpredictable. Executing a Goto to some error routine in our program would not be an adequate response, mainly because it wouldn't reset the stack and several faults in a row might cause the stack to overflow (resulting in yet another, more difficult to handle exception). However, we can easily overcome this problem by exploiting the little-known Windows functions Catch() and Throw().

Catch() and Throw() form a general-purpose mechanism for structured exception handling. You call Catch() at some

convenient central point in your program to save the current execution environment, including all CPU registers in a structure of type CATCHBUF. When Catch() is invoked in this way, it returns a value of zero. At some future point in the execution of your program, when you find yourself in a hopeless situation, you can call Throw() with the address of the CATCHBUF structure and an arbitrary value that can be anything but zero. Then something magical happens: The CPU state including the stack pointer is restored according to the contents of the CATCHBUF structure, and execution continues by "returning" from the origi-

nal call to Catch()—except that the value of Catch() this time is whatever you passed to Throw(). You distinguish the two possible types of return from Catch() by framing Catch() in an if{} structure:

```
CATCHBUF CatchBuf;
.
.
.
if(Catch(&CatchBuf))
{
    // we got here
    // by a Throw()
}
```

ISR.ASM Complete Listing

```
; ISR.ASM - umbrella interrupt handler for BADAPP3
; Copyright (C) 1992 Ray Duncan
; PC Magazine * Ziff Davis Publishing

        extrn    INTERRUPTCALLBACK:far

DGROUP group    _DATA

_DATA   segment word public 'DATA'

        extrn    _ActiveFlag:word

_DATA   ends

_TEXT   segment word public 'CODE'

        assume   cs:_TEXT,ds:DGROUP

ISR     public   ISR
        proc     far

        push     ds
        push     bp
        mov      bp,sp                ; point to stack frame
        mov      ds,ax                ; make DGROUP addressable

        test     _ActiveFlag,-1       ; is interrupt handling active?
        jz       ISR2                 ; no, jump

        cmp      word ptr [bp+0ah],0   ; check for Int 0
        je       ISR1                 ; (divide by zero) or
        cmp      word ptr [bp+0ah],0dh ; Int 0DH (GP fault)
        jne      ISR2                 ; jump if neither of these

ISR1:    push     [bp+0ah]              ; push interrupt number and
        push     [bp+10h]              ; far pointer to faulting
        push     [bp+0eh]              ; instruction

        call     INTERRUPTCALLBACK    ; transfer to C routine

ISR2:    pop      bp
        pop      ds
        ret

ISR      endp

_TEXT   ends

        end
```



Figure 4: The assembly language stub entered by a far call from TOOLHELP when an exception is detected. This code checks whether the exception should be serviced, and if so, passes control to the main handler written in C.

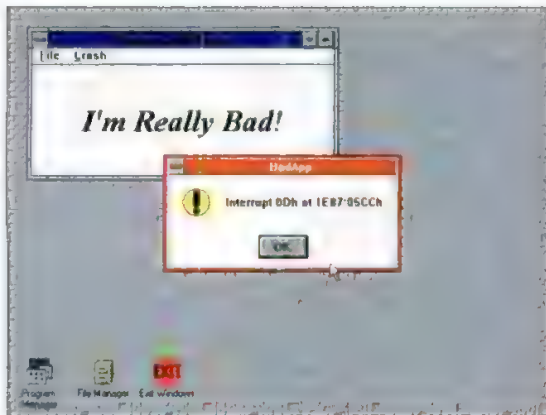


Figure 5: This is the dialog box displayed by BADAPP3 when a general protection fault is detected.

cleaned up enough so that we can safely display a dialog box about the error.

The other aspect of BAD-APP3 you may want to ponder and critique is the strategy for letting the exception callback know whether the application is currently in control. BAD-APP3 has a global, static-variable, called ActiveFlag, which is updated by the body of the program and checked by the stub routine ISR. I initially considered turning ActiveFlag on and off in the program's main event loop; that is, turning ActiveFlag

off before a call to GetMessage(), and turning it on again upon return from GetMessage(). Then it occurred to me that in the worst case (though not in this particular program), forced execution of another task that might be responsible for an exception could quite easily be hidden within the call to DispatchMessage()—for example, if one of the application's window message handlers called SendMessage(). Therefore, I decided to maintain the state of ActiveFlag within the window message callback routine instead, setting the flag to TRUE whenever an internal routine is explicitly run in response to a message, and setting it to FALSE before calling DefWindowProc or returning from the message callback. This approach could easily be extended by adding a new member to the messages[] structure that defines the state of ActiveFlag—and thus the handling of exceptions—on a per-message basis.

FURTHER READING A very helpful tutorial on TOOLHELP.DLL exception handling, written by Kraig Brockschmidt of Microsoft Developer Relations, can be downloaded from the WINSOCK forum on CompuServe in the file FAULTW.ZIP. I found the technique of using Catch() and Throw() in a Windows application exception handler in this document.

THE IN-BOX Please send your questions, comments, and suggestions to me at any of the following electronic mail addresses:

PC MagNet: 72241,52

MCI Mail: rduncan

BIX: rduncan

Internet: duncan@csmcvmvax.bitnet □

```
else
{
    // this was a return
    // from an intentional
    // call to Catch()
}
.
.
.
// bad error detected,
// bail out of our current
// hopeless state
Throw(&CatchBuf, 1);
```

The call to Catch() in BADAPP3 is located right in the frame window's message handler. Since Windows programs are message-driven, we can safely assume that a divide by zero or general protection fault is going to occur in some code that executes in response to a message. Therefore, we call Catch() immediately before decoding a message and handing it off to any internal subroutine. If a fault occurs, our assembly language stub, ISR, is entered, which in turn calls the C routine InterruptHandler(). InterruptHandler() saves the interrupt number and location of the faulting instruction for later display, then calls Throw(), and the CPU reverts to its state at Catch(). We are then free to back out of the situation by posting a private message to ourselves indicating that an error occurred, then handing the message to Windows' default message handler (DefWindowProc) instead of our own handler (since our own handler is now known to fault on the same message). By the time we have processed the private error message, the application state has been

Computers, FCC Class A, Class B, and You — or When is it better to get a B than an A?

You need to know the difference between computers that meet the FCC class B radio frequency emissions standards and those that meet only the Class A standards.

Computers emit radio signals in their operation. Because these signals may cause interference to radio and television reception, the marketing and the use of computers is regulated by the Federal Communications Commission. Under federal rules, computer users are responsible for remedying interference, including interference in neighboring homes.

Computers certified by the FCC as meeting the Class B standard are less likely to cause interference to radio and TV reception than those that have been verified by the manufacturer or importer to the Class A standards. Only Class B certified computers may be advertised, sold, or leased for use in residences. A similar regulatory program applies in Canada.

Buyers seeking computers for use in homes (including offices at home) should shop for computers and peripherals which have been Class B certified. These devices carry a label with an FCC ID number. Both new and used Class A verified devices may be sold only for use in commercial and industrial locations. Signals from computers are more likely to be masked by electrical noise from other equipment in such an environment. These areas are also likely to have fewer radios and TVs. Accordingly, equipment marketed only for use in these locations may meet the less rigorous Class A standard. Class B certified equipment may be marketed for use in residences as well as commercial and industrial locations.

As you shop for a computer for use in your home, look for the FCC classification in the specifications or ask your vendor to recommend only machines that have been certified to the Class B limits. TV viewers and radio listeners in your home and in neighboring homes will be glad you did.

Simply Faster

1-2-3 for DOS Release 2.4.

1-2-3® is not only easier to learn and use, it's simply faster than any other DOS spreadsheet, including Quattro® Pro Release 4.0, especially on IBM® XT's and 286 machines.

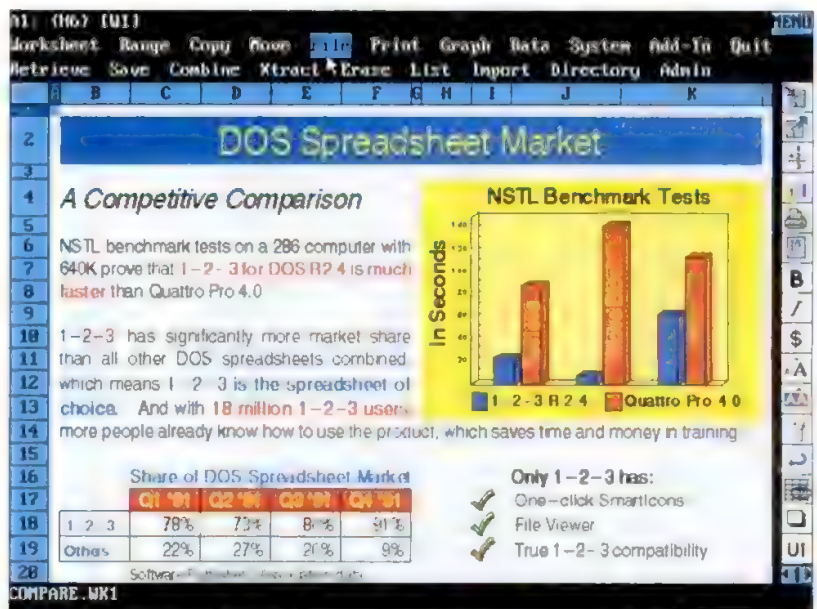
It's the only DOS spreadsheet to offer SmartIcons™—a unique palette of over 75 icons, 12 of which are customizable, giving you instant, one-click access to your most commonly performed spreadsheet



Only 1-2-3 offers SmartIcons for true one-click access to virtually all your spreadsheet tasks, unlike the limited SpeedBar™ in Quattro Pro which requires you to work through a menu tree.

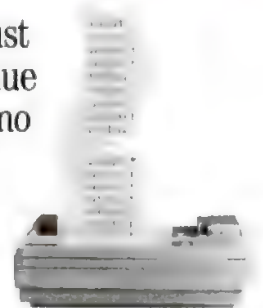
tasks. SmartIcons give you all the ease-of-use and graphical advantages of our Windows™ applications, without the need to change operating systems. And 1-2-3 for DOS also gives you such unique 1-2-3 features as File Viewer, Auditor and Backsolver, a quicker and more efficient goal-seeker. And only 1-2-3 for DOS offers true compatibility with all versions of 1-2-3 across platforms.

And right now, you can get both 1-2-3 for DOS Release 2.4 and Freelance Graphics® for DOS Release 4.0, our presentation graph-



Performance tests prove that 1-2-3 for DOS Release 2.4 beats Quattro Pro 4.0 in areas you care most about.**

ics package, together for just \$229—a suggested retail value of \$645. For a free auto demo or to order your upgrade directly from Lotus®, call* **1-800-TRADEUP, Ext. 7014.** Or visit your Lotus Authorized Reseller.



Now you can print reports in landscape mode on all printers, including dot matrix printers.

Lotus 1-2-3 for DOS

*In Canada, call 1-800-GO-LOTUS. Please have your credit card and product package ready when you call. **NSTL standards used in tests performed on an IBM AT™ 286 with 640K memory. ©1992 Lotus Development Corporation. All rights reserved. Lotus, 1-2-3 and Freelance Graphics are registered trademarks and SmartIcons is a trademark of Lotus Development Corporation. Windows is a trademark of Microsoft Corporation. Quattro is a registered trademark and SpeedBar is a trademark of Borland International, Inc. IBM and AT are registered trademarks of International Business Machines Corporation.

Floating Parens: Tighten up your negative-number parentheses in FoxPro

BY SAL RICCIARDI

Floating Parens

FoxPro provides a format specifier, @ (, that lets you place parentheses around a negative number in a report. The parentheses are fixed at the outer boundaries of the field. That is, a field with a width of eight characters will display -1 as

```
(      1)
```

To eliminate the unnecessary blank spaces and collapse the parentheses that appear around the number, you can use the PARENS () function that is shown in Figure 1.

Since FoxPro does not have a built-in format specifier for floating parentheses, this function can be useful when you're formatting numbers for display on the screen or in a report. To use the function, you pass it a number to format and a picture clause to use. For example,

```
? parens( 1234.99, "999,999.99")
? parens(-1234.99, "999,999.99")
? parens(-1.99, "999,999.99")
```

produces

```
1,234.99
(1,234.99)
(1.99)
```

This keeps things lined up nicely and is more attractive than using the fixed-position parentheses.

The PARENS () function starts by determining whether the value you pass it is positive. If the value is positive, parentheses are not required, so the function simply transforms the value using the picture clause you specify, then returns. If the value is negative, the PARENS () function still begins by using the TRANSFORM function to transform your value using your picture clause. But it also uses ALLTRIM to remove any surrounding blanks, appends a left parenthesis to the beginning using PADL, and appends a right parenthesis to the end using the + string concatenation operator. Thus you end up with collapsed parentheses around a negative number. Of course, the picture clause you provide must be long enough to accommodate the value. For example, if you issue the command

```
? parens(-111111.11, "'999,999.99'")
```

the result will be

```
(111,111.11
```

which is obviously missing the closing parenthesis.

When designing a report using Fox-

Pro's report writer, you can use the PARENS () function in a report expression instead of using the negative number format specifier (which you would select by choosing Format... in the Report Expression dialog and then Negative in the Format dialog). Later, when you run the report, you must make sure that the function is available to the report writer.

To do this, place PARENS in your main program or procedure file; or you can put it in a file called PARENS.PRG in your current directory or in a directory specified using SET PATH TO. Otherwise, if you are going to use this function only once in a report, you can cut the portion from the IIF to the end out of the PARENS function and paste it directly into the report expression (substituting the appropriate field or variable names for number and pic throughout the expression). Your report will run slightly faster, and you won't have to worry about making sure the PARENS () function is accessible. PARENS () is available in Library 13 of the Utilities/Tips Forum on PC MagNet. Look for it in PARENS.ZIP in the Databases section. □

THE PARENS FUNCTION

Complete Listing

```
*****
* FUNCTION parens
* This function will place parentheses around a negative number.
* No spaces will be displayed between the negative number and the
* parentheses (as they would be if the @( format code were used).
*****
FUNCTION parens
PARAMETER number, pic
RETURN IIF(number >= 0, ;
    TRANSFORM(number, pic), ;
    PADL("(" + ALLTRIM(TRANSFORM(ABS(number), pic)) + ")", LEN(pic) + 1, " "))
```

Figure 1: This user-defined function places floating parentheses around a negative number.

LET US HEAR FROM YOU

Share your database experience, tips, and techniques; we'll pay you \$50 for any submission we print. Mail your submission on a disk, accompanied by a printout, to Databases, *PC Magazine*, One Park Ave., New York, NY 10016; or upload it to PC MagNet (see page 12 for access instructions). You may also contact Sal Ricciardi via PC MagNet, mailbox 72241,33. We regret that we are unable to acknowledge submissions or answer questions individually.

Now You Can Get The Answers To Software Questions When You Need Them!



The most comprehensive and complete source of technical support information — on all the leading PC

software applications — is now available on a single CD-ROM.

To make certain that Support On Site is always the latest and most complete source of support information anywhere, every month a new, complete and updated compact disc is delivered directly to you.

WHAT DOES IT DO?

Support On Site helps you solve software problems quickly and simply. Its key uses are:

- Handling conflicts between products.
- Identifying the solutions to error messages.
- Configuring software.
- Obtaining the latest drivers and ancillary software.
- Providing information on advanced techniques.

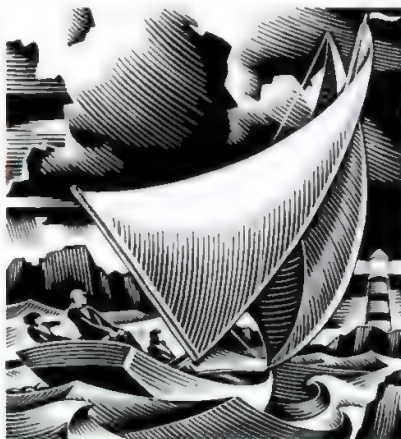
RIGHT AT YOUR DESK

Support On Site puts hundreds of functions and services that were outside your organization on site — right at your support desk.

EASY ACCESS

Support On Site combines extensive technical and operational software information in one quick, search-and-retrieve program. Nothing could be easier and no special training is needed.

Type the word or phrase that describes your problem, and the entire database is quickly searched. The information appears in front of you on the screen.



Support On Site™

FAST ANSWERS

No more hunting through manuals, waiting for 800# operators, searching bulletin boards or paying expensive computer consultants. You get the answers in seconds.

WHERE DOES THE INFORMATION COME FROM?

Support On Site puts software publishers' manuals and technical notes — that, until now, were not available — as well as information from Cobb Newsletters, reference books by Que and Ziff-Davis Press and tech notes from industry sources on your desktop. It is the most comprehensive, single source of technical support information on the leading PC software applications available anywhere.

Support On Site even includes proprietary software — drivers, patches, bug fixes and macros — directly from software publishers.

WHO NEEDS IT?

- HELP Desks
- End-User Computing Professionals
- Information Center Personnel
- MIS/DP
- Computer Resellers
- Independent Support Companies
- PC Vendors

SUPPORT FOR MAJOR APPLICATIONS

Aldus	Symphony®	PowerPoint®
Aldus® PageMaker®	Freelance Graphics™	Quarterdeck
Borland	Freelance Graphics™	DesqView™
dBase®	for Windows™	QEMM™
Quattro® Pro	Ami Pro™	Software Publishing
PARADOX®	Microsoft	Harvard Graphics™
MultiMate®	MS-DOS®	Symantec
Central Point Software	Microsoft® Windows™	Q&A™
PC Tools®	Microsoft® Excel®	WordPerfect
Fox Software	Microsoft® Word®	WordPerfect®
FoxPro™	Word® for Windows™	WordPerfect® for Windows™
Lotus	Microsoft® Works®	WordStar
Lotus® 1-2-3®	Microsoft® Works® for Windows™	WordStar®
Lotus® 1-2-3® for Windows™		

CALL NOW FOR FREE DEMO DISK

Find out how quick, easy and comprehensive Support On Site is — call today for a FREE demonstration disk. No obligation. No commitment. But lots of information.

1-800-827-7889 ext. 312

QUICK!

You can answer these questions in seconds.

1. Should you run FASTOPEN AND SMARTDRV concurrently?
2. How should you configure DESQview 386 to run with Lotus 1-2-3?
3. What causes a "Cannot load COMMAND.COM" message in DOS 5.0?



FAST ANSWERS TO SOFTWARE QUESTIONS

COMPUTER
LIBRARY
CIRCLE 009 ON READER SERVICE CARD

Improved String Searching: Enhance string searching by adding a Soundex routine to your BASIC programs

EDITED BY SHARON TERDEMAN

Improved String Searching

Most modern database languages (such as dBASE IV) have a built-in Soundex function to help identify names that, although spelled differently, are phonetically alike. The Soundex function and demo program shown in Figure 1 are meant for use with almost any contemporary version of BASIC, such as PowerBASIC, QBasic, QuickBASIC, and True BASIC. (Download SOUNDEX.BAS from PC MagNet as SOUNDE.BAS.)

The first Soundex algorithm was developed by Margaret K. Odell and Robert C. Russell in the 1920s. The routine presented here is based on their original algorithm. Here's the procedure it follows:

- The routine first capitalizes all letters to remove the differences in the ASCII codes for uppercase and lowercase letters.
- It retains the first letter of the name that it's attempting to identify.
- It assigns numeric codes to all letters after the first letter:

```
A,E,I,O,U,W = 0
B,F,P,V = 1
C,G,J,K,Q,S,X,Z = 2
D,T = 3
L = 4
M,N = 5
R = 6
```

- It ignores all zeros and nonalphabetic characters.
- If two or more letters with the same numeric code are adjacent in the name, it keeps only the code of the first letter.
- If there are more than three digits in the resulting code, it drops all digits after the first three.

- If there are fewer than three digits in the resulting code, it adds trailing zeros until there are three digits.

While my routine works reasonably well, it could be improved so that it looks for two-letter and three-letter combinations that are phonetically close together and combines them into a single group. Such combinations would include MAC,

MC, SEN, SON, and so forth.

Another problem is that, like all the Soundex routines I'm familiar with (including those in professional packages), mine assumes that at least the first letter of a name will always be correct, even if the rest of the spelling isn't. But this is not always true. For example, a name that begins with C can have the

SOUNDEX.BAS

Complete Listing

```
DEFINT A-Z
DECLARE FUNCTION Soundex$ (Word$)

CLS
LOCATE 2, 32, 1
PRINT ">>> SOUNDEX <<<"
PRINT : PRINT

DO
  LINE INPUT "Enter Last Name: "; LastName$
  PRINT "Soundex Code: "; Soundex$(LastName$)
  PRINT "Code Another Name (Y/N): ";
  YN$ = UCASE$(INPUT$(1))
  IF YN$ <> "Y" THEN END
  PRINT : PRINT
LOOP

FUNCTION Soundex$ (Text$)

  Word$ = UCASE$(Text$)
  Number$ = "01230120022455012623010202"
  SdxString$ = LEFT$(Word$, 1)

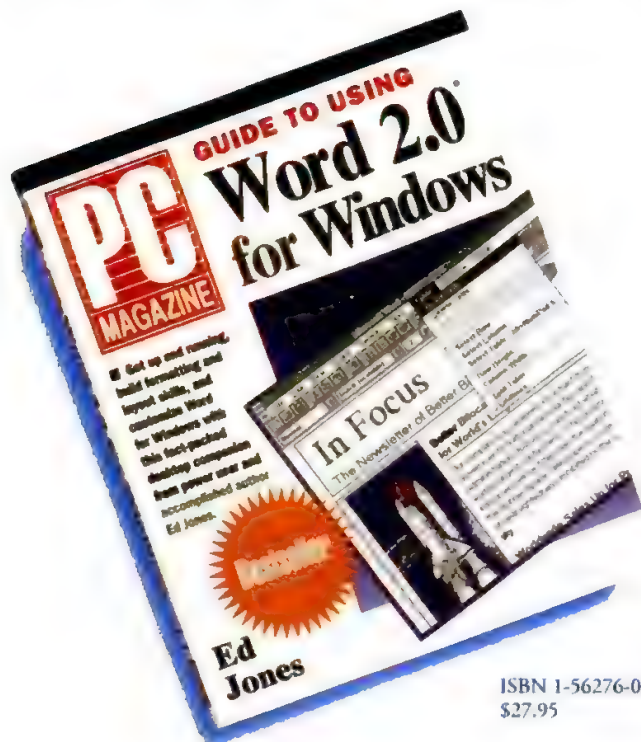
  FOR I = 2 TO LEN(Word$)
    E$ = MID$(Word$, I, 1)
    E = ASC(E$) - 64
    IF E >= 1 AND E <= 26 THEN
      This$ = MID$(Number$, E, 1)
      IF This$ <> Prev$ AND This$ <> "0" THEN
        Prev$ = This$
        SdxString$ = SdxString$ + This$
        Prev$ = This$
      END IF
    END IF
  NEXT I

  'Pad the output with trailing zeros and then clip it to four characters.
  Soundex$ = LEFT$(SdxString$ + "0000", 4)

END FUNCTION
```

Figure 1: This Soundex function returns a code that corresponds to the way a word sounds, making it possible to identify names that sound alike but are spelled differently.

Step Up to Word for Windows.



ISBN 1-56276-030-0
\$27.95

Step up to professional-quality documents with *PC Magazine Guide to Word 2.0 for Windows*. Best-selling author Ed Jones is a recognized master of the step-by-step writing style, which means quick learning with minimum effort. Crystal-clear explanations and dozens of generously illustrated examples will guide you from everyday typing and formatting right up through form letters, envelopes, tables, and even desktop publishing—all the supercharged features that are making Word 2.0 for Windows the emerging choice among Windows word processors. With each easy-to-follow chapter, Jones brings you one giant step closer to Word for Windows mastery.

Available at fine bookstores, or call
1-800-688-0448
ext. 1330



© 1992 Ziff-Davis Press

hard K sound or the soft S sound. Thus, a name spoken over the telephone may be recorded with the wrong first letter if not spelled out. Moreover, the assumption is that all names starting with a C begin with a similar sound, but this isn't true either. These appear to be limitations inherent in all Soundex routines; perhaps there is a way around them?

Vincent D. O'Connor
Babbitt, Minnesota

► **PC MAGAZINE** As Mr. O'Connor suggests, this routine can be improved if you

Soundex routines can be improved if you deviate from the standard method by not handling the initial letter in the name separately.

deviate from the standard Soundex method by not handling the initial letter in the name separately. For example, the standard Soundex method as implemented here will indicate that Cramer and Kramer do not sound the same, when in fact they do. Fortunately, the alteration is very simple. Remove the third line in the function

```
SdxString$ = LEFT$(Word$, 1)
```

and then change the FOR counter in the next line to start at 1 instead of 2. □

—Ethan Winer

SPEAK YOUR LANGUAGE

Share your knowledge of BASIC, C, C++, Pascal, and assembly language with *Languages* readers; we'll pay \$50 for any tip we print. Please send a disk along with a printout. Mail your contribution to *Languages*, *PC Magazine*, One Park Ave., New York, NY 10016, or upload it to PC MagNet. We regret that we are unable to acknowledge submissions or answer letters individually.

Find Everything You'll Ever Want To Know About Computer Products All In One Place!

IT SAVES TIME AND MONEY

Computer Select helps you make the right purchasing decisions — and avoid costly and time-consuming mistakes. It quickly provides all the information you need to identify, evaluate and select exactly the computer products that meet your particular needs.

- Identify the products that perform specific tasks.
- Compare the performance characteristics of competing products.
- Evaluate the suitability of products to your current operating environments.
- Obtain a wide range of expert opinion concerning each product.
- Keep up with the latest product and technology advances.
- Discover valuable tips and techniques to improve the performance of your existing products.

IT'S CONTINUALLY UPDATED

Computer Select is recognized throughout the industry as the most comprehensive and complete source of computer product information — including software applications, hardware and communications devices. Available on a single CD-ROM, it is constantly being improved and expanded.

To make certain that Computer Select is not only the most complete, but the latest source of product information, subscribers are sent an updated disc every month.

IT'S FAST

Computer Select puts hundreds of publications and tens of thousands of articles right at your desk — right at your finger-tips. But with Computer Select's unique search-and-retrieve



Computer Select®

program you can get the exact information you need quickly.

Merely type the word or combination of words that describe what you are looking for and the entire database is searched. The information appears on your screen in seconds.

IT'S COMPREHENSIVE

Computer Select gives you immediate access to tens of thousands of product reviews and analyses — an entire year's worth of articles, updated every month. The information comes from leading industry publications such as *PC Magazine*, *PC Week*, *InfoWorld*, *MacUser*, *LAN Times* and *LAN Technology* — over 170 in all!

In addition, Computer Select incorporates all the reference information from *Data Sources*, the foremost directory of computer products and companies. It also contains electronic versions of Alan Freedman's *Computer*

Glossary and Harry Newton's *Telecom Dictionary*. That means you get:

- 12 months of information from 170 leading computer publications.
- Specs on over 72,000 hardware, software and data communications products.
- Profiles, addresses and phone numbers of 13,000 computer companies.
- Definitions for 11,000 computer and telecommunication terms.

WHO NEEDS IT?

Computer Industry Managers
Purchasing Agents
Information Center Personnel
Hardware and Software Marketers
PC Vendors
MIS/DP Managers
Computer Resellers
Independent Support Companies
Universities and Trade Schools

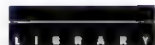
"In ten minutes, Computer Select can give me sixty pages of in-depth reports on whatever I need to know about — ISDN, SONET, video conferencing or multimedia."

William Tyler, New York Telephone

CALL NOW FOR FREE DEMO DISK

Find out how quickly and easily you can find exactly the computer products you need — call today for a FREE Computer Select demonstration disk. No obligation. No commitment. Tons of information.

1-800-827-7889 ext. 102



The Fastest Way To Find The Perfect Product



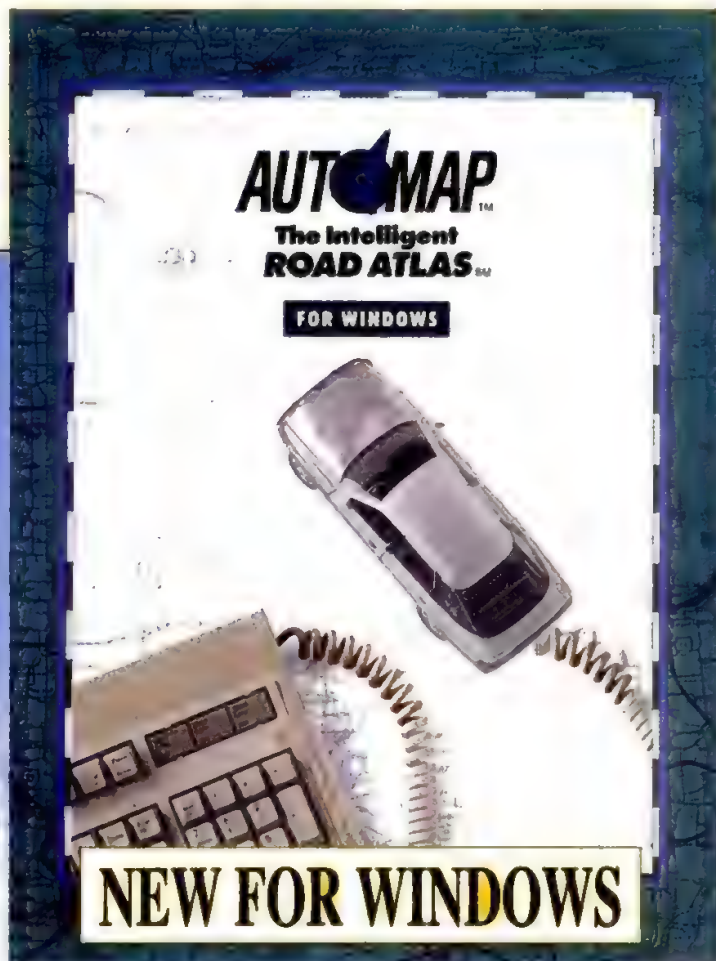
Windows *on the* Road

\$53

AUTOMAP

The Intelligent Road Atlas

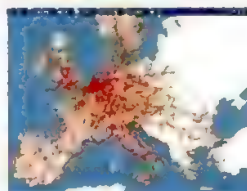
Unique software packages that provide instant route planning and data profiles for over thousands of cities in the USA, Canada and Europe, searching its large database of roads and highways for the fastest, shortest, or most convenient route to meet your needs. Maps and detailed directions can be viewed on your screen and printed.



\$53 AUTOMAP



EUROPE \$75



Call Toll Free from anywhere in the United States
Monday thru Friday • 8:00AM to 5:00PM PST

1-800-274-6611



Plain Wrap Prices,
Black Tie Service.

Or FAX Your Order!

1-818-884-5310

◆ FREE GROUND SHIPPING ◆ NO CREDIT CARD SURCHARGES ◆ SAME DAY SHIPPING ◆

PRICES SUBJECT TO CHANGE

20069 Ventura Blvd., Suite 13, Woodland Hills, CA 91364 • (818) 710-9174

CIRCLE 017 ON READER SERVICE CARD



The Purchasing Source for Direct Buyers

- *2,500 products to choose from*
- *Dozens of America's Top Direct Marketers*
- *Great Value for Your Money*
- *Service & Support Experts*
- *Fast Delivery*



INDEX

Systems		
Comtrade	422	
Edge Computers	431	
FASTMICRO	443	
Insight Computers	412	
PCs Compleat	434	
PCs Compleat	460	
Primax	418	
Tangent Computer, Inc.	420	
USA Flex	438	
Vortex	426	
Software, Peripherals, Components		
Arlington Computer Products ..	436	
Buffalo	442	
Bulldog Computer Products ..	468	
Compuclassics	454	
Computability	461	
Computer Discount Warehouse ..	465	
DH Systems	455	
Dustin Discount Software	410	
Dustin Discount Software	416	
FAST MICRO	448	
First Source International	469	
H Co. Memory Upgrades	442	
Hard Drives International	458	
LA Trade	452	
Midwest Computer Works	464	
Pacific Wave (Paradise)	463	
Peripheral Express	450	
Software Add-Ons	462	
Telemart	456	

The fast Insight 486.

There is no doubt, Insight's 486s are the ultimate power tools. Highly configured and loaded with brand-name components, these are the fastest systems on the market. And look at the variety!

All 486s support the Intel® OverDrive™ processor for future performance upgrades. Order a fast Insight 486 today.



ISA

- Genuine Intel® CPU
- 4MB RAM • 64K Cache
- 120MB 16ms IDE HD w/Cache
- 240MB with Stacker™
- Non-Interlaced 14" SVGA Color Monitor
- 24 Bit 1MB Graphics Accelerator Super VGA Card
- 12MB 5.25" Floppy Drive
- 1.44MB 3.5" Floppy Drive
- 2 Serial Ports • 1 Parallel Port
- Enhanced 101 Key Keyboard
- MS-DOS® 5.0 • Mouse
- Choice of Case
- Stacker™ Software
- Add CD-ROM drive for \$299
- 386SX-25MHz & 386-25MHz systems also available!

386DX-33MHz

\$1449

486SX-25"

\$1549

486-33

\$1799

486DX2-50

\$1999

486-50

\$2099

486DX2-66MHz

\$2399



486 EISA

- Intel® 80486 CPU
- EISA 32 Bit Bus Architecture
- 8MB RAM • 256K Cache
- 520MB 12ms SCSI HD w/Cache
- 32 Bit EISA Controller w/ 2MB
- Non-Interlaced 14" SVGA Color Monitor
- 24 Bit 1MB Graphics Accelerator Super VGA Card
- 12MB 5.25" Floppy Drive
- 1.44MB 3.5" Floppy Drive
- 2 Serial Ports • 1 Parallel Port
- 120/250MB Tape Backup w/ Tape
- Enhanced 101 Key Keyboard
- MS-DOS® 5.0 • Mouse
- Choice of Case
- Stacker™ Software
- Add CD-ROM drive for \$299

486-33MHz

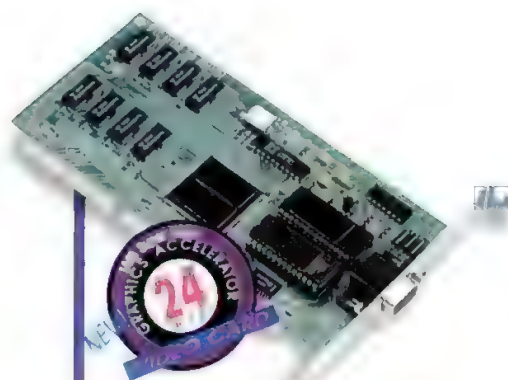
\$3699

486DX2-50MHz

\$3799

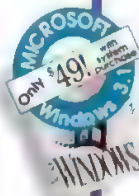
486-50MHz

\$3999



Faster performance.

- **24** Bit graphics accelerators are now standard on all Insight 486s! 10 times faster than conventional SVGA, these record-breaking video cards can support resolutions up to 1280 x 1024. Also capable of displaying up to 16 million colors.
- Proven components maximize processing speeds.
- Insight R & D techs continuously test component combinations to deliver optimal system performance.
- Federal Express Shipping makes sure your Insight Computer gets to you FAST.



Low Cost Add-Ons!



1. Follow instructions on the other side

Back

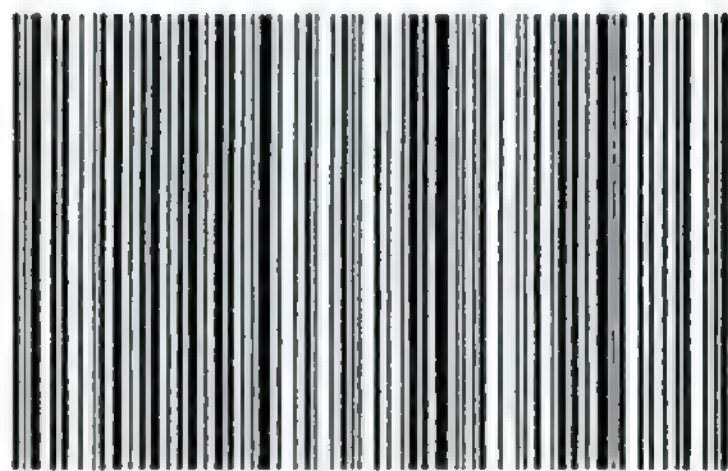
Gbs5llpBack-0018



Inverted Back

1. Follow instructions on the other side

Folded edge of the page



Inverted Foldout slip-sheet

Foldout slip-sheet

1. Open the foldout page

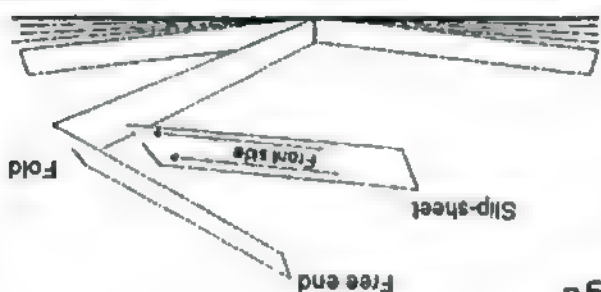
2. Insert this sheet with

1. Front side touching the free page

2. Arrow pointing to the fold

3. Slice the folded edge

4. Close the page and slip-sheet



1. Open the foldout page

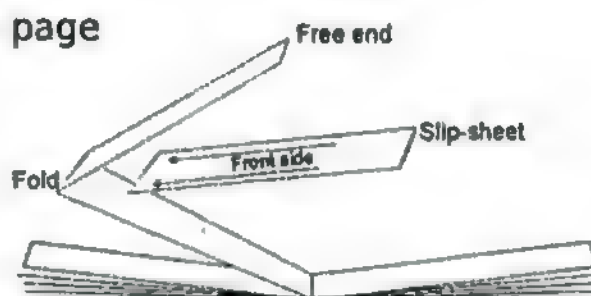
2. Insert this sheet with

1. Front side touching the free page

2. Arrow pointing to the fold

3. Slice the folded edge

4. Close the page and slip-sheet



Better service.

- **Order 24 hours a day!**
- Toll-free sales, service and support, 7 days a week.
- Payment options galore, including leasing and the Insight Credit Card!
- Express Parts Replacement.
- Fully upgradable 486s.
- Low-cost add-ons.
- No extra charge for full vertical cases on 486 systems.
- FCC Class B certification (residential systems).
- 1 Yr. parts and labor warranties with extended warranties available.
- 30-Day "Worry-Free" Guarantee
- Buy a "486 Special Configuration" and have it shipped within 24 hours!



800-755-3916

National Accounts: 800-755-3924

1912 W 4th St Tempe, AZ 85281 • 602-350-1176

International 602-350-1144 Fax 602-350-1182

The best notebook.

The hottest thing on 4 megs! Driven by a powerful 25MHz processor, the Insight 386SXL Notebook is the lightweight workhorse you've been waiting for. Weighing in at under 6 lbs. (w/ battery), it's loaded with an 80MB hard drive and 4MB RAM to handle your most demanding applications. It's equipped with a 1.44MB 3.5" floppy drive and features a pop-in/pop-out hard drive making it user upgradable!



Notebook

- Low Power Requirement
- 4MB RAM (Expendable to 8MB)
- 80MB 19ms IDE Hard Drive 160MB with Stacker™
- 8.5x11x1.8, Under 6 pounds
- 1.44MB 3.5" Floppy Drive
- 10" sidelit 64 level LCD Greyscale VGA
- 80 Key Kbd. (101 Key emulation)
- NiCad Battery Pack
- AC Adapter/Recharger
- 1 Serial Port • 1 Parallel Port
- Ext. VGA Port & Ext. Keyboard Port
- DOS 5.0 • Carrying Case • Mouse
- Stacker™ Software

386SXL-25 MHz

Add-ons

- 2400 Baud Modem **\$129**
- 9600/2400 Baud S/R Fax Modem **\$249**
- Quick Charger **\$89**
- Numeric Keypad **\$49**
- Extra Battery **\$75**
- 120MB Drives Available
- Extra RAM Available



*Prices and availability subject to change without notice. 30 Day Guarantee and 1 Year Warranty exclude software and may have some restrictions. 30-Day Guarantee not available on lease purchases. Corporate lease rates based upon 24 or 36 month F.M.V. lease plus applicable sales tax. Two months advance deposit required. Individual lease rates will vary. The "Intel Inside" logo is a trademark of Intel Corporation. All trademarks and trade names herein are the properties of their respective owners. ©Insight Distribution Network, Inc. 1992 9/29/92

Better;
faster;
cheaper.

all three!
Pick ~~one~~.

Insight

all you need to know!

800-755-3916

Get it all with Insight Computers.



Our best sellers.

Need a fully-loaded, value-packed '486 right now? No problem! We've specially configured and pre-built a few of our hottest selling systems and they're ready to ship today! Place your order before 5 P.M. (MST) and we'll ship your computer within 24 hours*. Guaranteed!

486 SPECIAL CONFIGURATIONS

- Intel® 80486 Processor
- 4MB RAM • 64K Cache
- 210MB 16ms IDE HD w/Cache
420MB with Stacker™
- 24 Bit 1MB Graphics Accelerator
Super VGA Card
- 12MB 5.25" Floppy Drive
- 1.44MB 3.5" Floppy Drive
- 2 Serial Ports • 1 Parallel Port
- Enhanced 101 Key Keyboard
- MS-DOS® 5.0 • Mouse
- Full Vertical Case
- Stacker™ Software

486SX-25 MHz

\$1749

486-33 MHz

\$1999

486DX-50 MHz

\$2299



Get Insight quick!

That's right. Order any of our three 486 "Special Configuration" systems by 5 P.M. (MST) and we'll ship it within 24 hours! Guaranteed*.

The guarantee.

If we accept your order for 24 hour shipment, and fail to ship your 486 "Special Configuration" as promised, your system shipping costs are on us! This offer is good as long as these pre-built systems are in stock.



The fine print.

1. Order by 5 P.M. (MST) M-F.
2. Order subject to credit approval.
3. P.O.'s subject to add'l conditions.
4. You must order a 486 "Special Configuration" as listed here. (Custom orders take a tad longer.)

Better selection, systems & service.

"Whether you're a power user or LAN administrator, Insight has a system for you at a price you can afford."

- Computer Shopper 1/92

Faster graphics, performance & delivery.

"Incredibly fast... faster in both benchmark testing and subjective observations of daily usage." - PC Sources 8/91

Cheaper prices on everything.

"For a surprisingly low price, Insight managed to pull together a very powerful system" - PC Magazine 3/17/92

With a little help from our friends.

- The combined buying power of Insight Computers and Hard Drives International (our sister company) keeps your system cost ROCK BOTTOM without compromising quality.
- Hard Drives International is a four time Computer Shopper "Best Buy" award winner, as well as recipient of PC Magazine's Editor's Choice Award for Mass Storage.



all you need to know!

800-755-3916

National Accounts: 800-755-3924



CKR

Let Dustin handle

ACCOUNTING FINANCE

ACC PAC BPI Series	255.
ACC PAC Simply Accounting Windows	135.
DAC Easy Accounting 4.2	105.
DAC Easy Bonus Pack	135.
DAC Easy Payroll 4.2	89.
MS Money for Windows	55.
One Write + Accounting	115.
Peachpay	55.
Peachtree Accounting for Windows	89.
Peachtree Complete Accounting	CALL
PFS:Business Plan Windows	85.
Point-of-Sales Acctng	245.
Quickbooks	95.
Quicken 5.0 DOS or WIN	49.
Sales Order Acctng	245.
Wealth Starter	45.

BUSINESS GRAPHICS

Calendar Creator Plus	49.
Charisma	339.
Easy Flow 7.0	169.
Flowcharting III	149.
Formtool Gold 3.0	65.
Freelance Graphics	339.
Freelance Graphics Windows	339.
Freelance Upgrade DOS or WIN	99.
Harvard Graphics for Windows	369.
Harvard Graphics 3.0	409.
Harvard Graphics Win Upgrade	125.
Hollywood	309.
Make Your Point	55.
Org Plus Advanced	69.
Org Plus Advanced For Windows	135.
Perform Professional	195.
Powerpoint For Windows	325.
Stanford Graphics	359.

CAD DRAFTING

Design CAD 3D	259.
Design CAD 5.0	185.
Design Your Own Home/Arch	45.
Design Your Own Home/Interior	59.
Design Your Own Home/Lndsep	59.
Design Your Own Railroad	49.
Drafix CAD for Windows	439.
Easy CAD 2	119.
Fast CAD	529.
Generic 3D Drafting	215.
Generic CAD 6.0	289.

CD-ROM DISKS AND DRIVES

NEC CD Gallery w/CDR 74	779.
NEC CD Gallery w/CDR 37	519.
Comptons Family Encyclopedia	299.
Corel Blockbuster w/Int CD-ROM	899.
Corel Draw CD	449.
Family Choice	69.
MS Multimedia	
Beethoven CD	59.

MS Multimedia Bookshelf

Win CD	139.
MS Multimedia Devel Kit CD	329.
Multimedia Toolbook CD	529.
Street Atlas USA CD	99.
Sound Blaster Pro CD	209.
Where is Carmen - World Deluxe CD	55.

COMMUNICATIONS

Carbon Copy for DOS or WIN	119.
Crosstalk XVI	129.
E Note for Windows	39.
Laplink Pro 4.0	109.
Novell Products	CALL
PC Anywhere 4.5 Host/Rmt	119.
Procomm Plus 2.0	79.
Procomm Plus 2.0 Windows	89.
Q-Modem	65.
Terminal Plus	CALL
Wildcat BBS	89.
Winfax Pro	79.
WordPerfect Office PC	95.

DATABASE/DEVELOPMENT

Arago DBXL 1.3	399.
Ask Sam 5.0	229.
Clipper	519.
DataPerfect	295.
DB Fast Windows	345.
DBase IV	519.
Easy Data For Windows	39.
Family Tree Maker	45.
Foxbase + LAN	305.
Foxbase Plus	199.
Foxpro 2.0	479.
Foxpro 2.0 6-User Pack	549.
Foxpro 2.0 Distribution Kit	309.
Instant Database	55.
Matt Wheelans Compiler	799.
Nantucket Tools	469.
Nutshell Plus II	229.
Paradox	549.
Paradox Upgrade	169.
PC-File	89.
Q & A 4.0	265.
R&R Report Writer 4.0	165.
Superbase 4 - Windows	469.

DESKTOP PUBLISHING & FONTS

Adobe Postscript Cartridge	259.
Adobe Type Library	CALL
Adobe Type Manager Windows	69.
AdobeType Align Windows	69.
By Design	65.
Classic Faces	79.
Corel Draw	389.
Corel Draw OS/2	389.
Display Faces	59.
Express Publisher	109.
Fonts On The Fly	99.
More Fonts	79.
More Typefaces	39.
Omnipage 386	469.
Pagemaker	529.
PFS: Publisher Windows	99.
PFS:First Graphics	65.
PFS:First Publisher	99.

PFS:Resume & Job Search

Publish It	149.
Publisher For Windows	139.
Readright For Windows or DOS	319.
Streamline Windows	135.
TrueType Fonts For Windows 3.1	39.
Ventura Publisher 4.0	525.

EDUCATION & TRAINING

Automap Windows	53.
Auto Works	38.
Automap	53.
Automap California	79.
Automap Europe	79.
Body Works	43.
Chemistry Works	38.
Distant Suns Windows	55.
Dr. Schulers Home Medical Advisor	45.
French Assistant	49.
German Assistant	49.
Italian Assistant	49.
Learning DOS	39.
Orbits	33.
PC Study Bible	95.
PC Globe	49.
PC USA	35.
Spanish Assistant	49.
Sprout	39.
Typing Tutor V DOS or Win	39.
Vista Pro	75.
Where is Carmen... Series	CALL

GAMES & ENTERTAINMENT

Falcon 3.0	55.
Flight Simulator 4.0	49.
Flight Assignment ATP	45.
Game Pack Windows	29.
Jet Fighter II	45.
Ultimate Golf	39.

GRAPHICS & CLIP ART

Apprentice Designer	89.
Dr. Halo IV	399.
Dr. Halo IV Upgrade	79.
Freehand For Windows	49.
Graphics Composer	409.
Graphics Editor	265.
Halo Desktop Imager	365.
Harvard Draw Windows	89.
Hijaak	429.
Hijaak For Windows	105.
Illustrator Windows	139.
Inset	385.
Painter	85.
PC Paintbrush IV Plus	275.
Photofinish	125.
Picture Publisher	129.
Picture Wizard	415.
Publishers Paintbrush 2.0	55.
Windows	295.
The New Printshop	45.

INFORMATION/PROJECT MANAGEMENT

Act!	229.
Act! For Windows	255.
Address Book Plus	59.
BCIM Windows	59.
Daybook Plus	45.

Everybody's P

First Act	75.
Harvard C	489.
Harvard	75.
Idea	65.
Inf	CALL
	CALL
	99.
	59.

Lotus 123 for Windows

Time	53.
Timeline w	38.
INTEGRATED	53.
Framework IV	CALL
Lotus Works	459.
PFS:First Choice	99.
PFS:Windowworks	99.
Smart Suite	89.
Smart Suite Upgrade	469.
Symphony 2.2	339.
Works 2.0	519.
Works F	105.
Works F	135.

MATH	
Dem	155.
Max	319.
Math	319.
Math	859.
Math	859.
MEDIA	
Knowledge Adventure	59.
MS Multimedia Resource	235.
Make Your Point	75.
Multimedia Toolbook	529.
NEC Multimedia Upgrade	CALL

Optima 24	129.
Optima 96	119.
PM14400FX Send/Rec Fax	199.
PM2400 V.42BIS	59.
PM2400FX96 Send/Rec Fax	59.
PM2400PPM Pocket	59.
Modem	119.
PM2400PPm Pocket W/Fax	169.
PM9600 V.32N/42 BIS	299.

MODERN	
ESP	
Optima 24	129.
Optima 96	119.
PM14400FX Send/Rec Fax	199.
PM2400 V.42BIS	59.
PM2400FX96 Send/Rec Fax	59.
PM2400PPM Pocket	59.
Modem	119.
PM2400PPm Pocket W/Fax	169.
PM9600 V.32N/42 BIS	299.

INFORMATION/PROJECT MANAGEMENT	
Everybody's Planner	59.
First Act	59.
Harvard Graphics Windows	365.
Harvard Project Manager	459.
Idea Fisher	359.
Info Select 2.0	99.
MS Office For Windows	489.
On Target Windows	269.
Pack Rat Windows	249.
Project For Windows	455.
Timeline 5.0	455.
Timeline Windows	475.
Timeline Windows Start Kit	119.

MODERN	
ESP	
Optima 24	129.
Optima 96	119.
PM14400FX Send/Rec Fax	199.
PM2400 V.42BIS	59.
PM2400FX96 Send/Rec Fax	59.
PM2400PPM Pocket	59.
Modem	119.
PM2400PPm Pocket W/Fax	169.
PM9600 V.32N/42 BIS	299.

MODERN	
ESP	
Optima 24	129.
Optima 96	119.
PM14400FX Send/Rec Fax	199.
PM2400 V.42BIS	59.
PM2400FX96 Send/Rec Fax	59.
PM2400PPM Pocket	59.
Modem	119.
PM2400PPm Pocket W/Fax	169.
PM9600 V.32N/42 BIS	299.

MODERN	
ESP	
Optima 24	129.
Optima 96	119.
PM14400FX Send/Rec Fax	199.
PM2400 V.42BIS	59.
PM2400FX96 Send/Rec Fax	59.
PM2400PPM Pocket	59.
Modem	119.
PM2400PPm Pocket W/Fax	169.
PM9600 V.32N/42 BIS	299.

MODERN	
ESP	
Optima 24	129.
Optima 96	119.
PM14400FX Send/Rec Fax	199.
PM2400 V.42BIS	59.
PM2400FX96 Send/Rec Fax	59.
PM2400PPM Pocket	59.
Modem	119.
PM2400PPm Pocket W/Fax	169.
PM9600 V.32N/42 BIS	299.

MODERN	
ESP	
Optima 24	129.
Optima 96	119.
PM14400FX Send/Rec Fax	199.
PM2400 V.42BIS	59.
PM2400FX96 Send/Rec Fax	59.
PM2400PPM Pocket	59.
Modem	119.
PM2400PPm Pocket W/Fax	169.
PM9600 V.32N/42 BIS	299.

it for you.



More Windows	59.	PM2400 V.42BIS	129.	Lotus 123/WIN & Ami Pro	
Move'em	55.	PM2400FX96 Send/Rec Fax	109.	Double Upgrade	159.
Norton Antivirus DOS or WIN	95.	PM2400PPM Pocket		Lotus 123 V2.4	349.
Norton Back Up DOS or WIN	95.	Modem	119.	Quattro Pro	319.
Norton Commander	99.	PM2400PPm Pocket W/Fax	169.	Quattro Pro SE	55.
Norton Desktop For Dos	99.	PM9600 V.32/V.42 BIS	299.	Quattro Pro Upgrade	99.
Norton Editor 2.0	75.	Pocket Edition 2400	115.	SQZ 2.0	75.
Norton Utilities 6.01	119.	Smartcom Executive	79.	Wingz For Windows	335.
Novi Antivirus	85.	Smartcom III	119.	UTILITIES	
Novi Antivirus Multi-Packs	CALL.	Smartmodem 1200		386 Max 6.0	59.
PC Kwik Powerpak	85.	External	279.	After Dark Windows	35.
PC Tools Deluxe 7.1	119.	Smartmodem 1200B		Allsafe	95.
	55.	Internal	145.	Blue Max	85.
	99.	Smartmodem 2400 External	289.	Check It	89.
	95.	Smartmodem 2400B		Copy II Deluxe Option Board	115.
	55.	Internal	235.	Direct Access	69.
		Ultra 144	CALL	Direct Access Windows	CALL
		Ultra 96	CALL	Disk Manager	45.
		OPERATING SYSTEMS		Fastback Plus	119.
		Desqview 2.4	85.	Fastback Plus Windows	125.
		Desqview 386 2.4	139.	Magellan 2.0	75.
		Dr DOS 6.0	75.	More Windows	59.
		Dr. DOS Multiuser	489.	Move'em	55.
		MS DOS 5.0	75.	Norton Antivirus DOS or WIN	95.
		MS DOS 5.0 Upgrade	65.	Norton Back Up DOS or WIN	95.
		SCO Unix 386 Dev	CALL	Norton Commander	99.
		SCO Unix 386 OS	CALL	Norton Desktop DOS or WIN	99.
		Windows 3.1	99.	Norton Editor 2.0	75.
		Windows 3.1 Upgrade	59.	Norton Utilities 6.01	119.
		PERIPHERALS & ACCESSORIES		Novi Antivirus	85.
		Mouseman Bus	79.	Novi Antivirus Multi-Packs	CALL
		Mouseman Cordless	99.	PC Kwik Powerpak	85.
		MS Mouse	95.	PC Tools Deluxe 7.1	119.
		MS Mouse w/Paint	109.	PK Zip	55.
		MS Mouse w/Windows 3.1	165.	Print Cache	99.
		Trackman	79.	Print Q	95.
		Trackman Portable	109.	Q DOS III	55.
		PROGRAMMING		QEMM 386	65.
		MS Basic Pro		GRAM	55.
		Development 7.1	329.	SPF/PC	195.
		Borland C++	325.	Spinrite II	65.
		Borland C++W/App Fmwk	499.	Stacker	89.
		Brief	179.	Superstor	89.
		C Compiler w/Quick C	489.	Virusafe	69.
		Data Boss C or Pascal	349.	X Tree Gold 2.5	99.
		Install Boss	69.	X Tree Net Advanced	325.
		Objectvision 2.0	105.	WORD PROCESSING	
		OS/2 Pres Mgr Toolkit	335.	Ami Pro	CALL
		Quick Basic	75.	Ami Pro Comp Upgrade	CALL
		Quick C	75.	Grammatik DOS or WIN	65.
		Quick C For Win/WIN SDK	489.	Just Write	165.
		Quick C For Windows	139.	Lotuswrite	135.
		Smalltalk V	85.	Merge Master	65.
		Smalltalk Windows	325.	MS Word	229.
		Toolbook	299.	MS Word For Windows	319.
		Turbo C++ 3.0	75.	MS Word For WIN Comp	
		Turbo C++ For Windows	109.	Upgrade	129.
		Turbo Pascal Windows	139.	PFS:Write	85.
		Visual Basic	125.	Professional Write 2.2	175.
		Windows Development		Professional Write Plus	
		Toolkit	235.	Windows	175.
		Zortech C++	455.	Rightwriter DOS or WIN	65.
		SPREADSHEETS		Screen Extender For WP	65.
		Excel	319.	WordPerfect 5.1 DOS	
		Excel Upgrade	105.	or WIN	279.
		Lotus 123 Upgrade DOS		WordPerfect 5.1 Node	189.
		or WIN	99.	WordPerfect Win Comp	
		Lotus 123 V3.1 +	419.	Upgrade	125.
		Lotus 123 Windows	389.	WordPerfect Win Upgrade	89.

THE DUSTIN DIFFERENCE

Free Ground Shipping

Same Day Shipping

Overnight Delivery Available

Corporate PO's, APO's & FPO's Welcome

Government & Educational Pricing

Visa, MC & AMEX Accepted

No Credit Card charges Until Shipping

No Credit Card Surcharges

24-Hour FAX Order-Line

Latest Versions Available

Thousands of Items in Stock

Manufacturers' Warranties & Documentation

Call for Free Catalogue & Any Items Not Listed



Plain Wrap Prices,
Black Tie Service.

20969 Ventura Blvd., Woodland Hills, CA 91364 (818) 710-9174

Call Toll Free from anywhere in the United States
Monday thru Friday—6:00AM to 5:00PM PST

1-800-274-6611

Or Fax Your Order!

1-818-884-5310

We will promptly replace any defective items returned within 30 days, but cannot guarantee compatibility. There is a 15% restocking fee on any non-defective, unopened goods, and all returns must be accompanied by a Returned Merchandise Authorization. Software prices do sometimes fluctuate beyond our control and may change, for better or worse, without notice. While ground shipments are free, we do ask \$11.00 per item for 2-day, \$22.00 per item for overnight, and \$4.50 for C.O.D. Although shipping heavier items may be slightly more, bulk orders can be a lot less. Free catalogues are available upon request, and please call us for any item not listed.

THESE NOTEBOOKS HELP YOU LIGHTEN YOUR LOAD



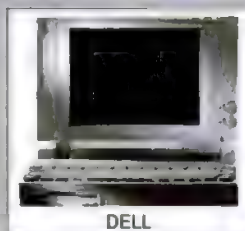
ZEOS



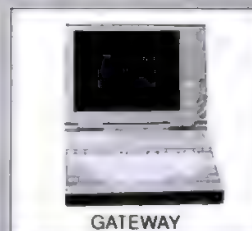
COMPAQ



TOSHIBA



DELL



GATEWAY

"BY EMPTYING YOUR PocketBOOK"

NOW PRESENTING

PRIMAX

"The Affordable Portable Technology Company"

PRIMAX NightHawk 325sxl

2 Year PRIMACARE Warranty

PRIMAX Eagle 425sx

2 Year PRIMACARE Warranty



\$1395

AMD386sxl 25MHz CPU
2Mb RAM (exp. 8Mb)
60MB Hard Disk
MS DOS 5.0
PRIMAX DUROFLEX Case



\$1995

Intel 486sx 25MHz CPU
4Mb RAM (exp. 20Mb)
80MB Hard Disk (Opt.120)
MS DOS 5.0
PRIMAX DUROFLEX Case



System Includes:

- AMD 386sxl/25 MHz CPU
- 2 Mb RAM (exp. 8 Mb)
- 60 Mb (Opt. 80, 120) Hard Disk
- 6.4 lb. (incl battery)
- Crystallmax 10" 32 Greyscale Supertwist LCD
- Advanced Power Management System
- 2-3 Hours Nickel Cadmium Battery
- Serial / Parallel Ports
- Keyboard / Keypad Ports
- Ext. VGA Port with (simultaneous LCD/CRT)
- Inverted "T" Cursor Keys
- Co-Processor Socketed
- Internal 2400 Fax/Modem (Optional)
- PRIMAX Instacharge AC Power Adaptor
- Water/Shock Resistant Case Included
- MS DOS 5.0
- 2 Year PRIMACARE Warranty (call for details)

System Includes:

- Intel 486sx/25 MHz CPU
- 4 Mb RAM (exp. 20 Mb)
- 80 Mb (Opt. 120) Hard Disk
- 6.4 lb. (incl battery)
- Crystallmax 10" 64 Greyscale Supertwist LCD
- Advanced Power Management System
- 2-3 Hour **Nickel Hydride** Battery
- Serial / Parallel Ports
- Keyboard / Keypad Ports
- Ext. VGA Port with (simultaneous LCD/CRT)
- Inverted "T" Cursor Keys
- Co-Processor Socketed
- Internal 2400 or 9600 Fax/Modem (Optional)
- Expansion Station Ready
- PRIMAX Instacharge AC Power Adaptor
- Water/Shock Resistant Case Included
- MS DOS 5.0
- 2 Year PRIMACARE Warranty (call for details)

COLOR AND DX MODELS ALSO AVAILABLE



EST. 1986

PRIMAX CORPORATION

PRIMAX 40,000 sq. ft. manufacturing and distribution center

TO ORDER CALL:

U.S.A.

CANADA

(800) 949-8088 (800) 668-4305

PRIMAX CORPORATION
5450 N.W. 33rd Ave.
Unit #101, Ft. Lauderdale
Florida 33309
International: (305) 735-4885
Local: (305) 735-0039
Fax: (305) 735-2998

PRIMAX COMPUTER CORP.
52 Bramwin Crt.
Brampton
Ontario
L6T 5G2
Local: (416) 792-2442
Fax: (416) 792-2843



Net Terms Available to approved Government & Corporate Accounts

All Names and Trade Marks belong to their respective owners. Florida residents add 6% retail sales tax. All prices are subject to change without notice. All prices are in U.S. dollars. Prices listed are valid only in the U.S. Canadian prices can be obtained through the Canadian office. All shipping is by AIR COURIER (call for rates). All returns are subject to RMA approval. AMEX and DISCOVER are not accepted in Canada. PRIMACARE 2 Year Warranty includes (2 Years labour and 1 Year parts). Not responsible for Misprints or Typographical errors.

CIRCLE 333 ON READER SERVICE CARD

ADVISOR

MultiBoot Upgrade: Using *PC Magazine's* MultiBoot utility with DOS 5.0 **Tracking Files:** Are there files on your hard disk you never use?

BY JOE SALEMI

MultiBoot Upgrade

Prior to upgrading to DOS 5.0, I loved the MultiBoot program obtained from PC MagNet. However, it doesn't work with DOS 5.0. Am I doing something wrong, or is a new version in the works?

Richard G. Barrows
Elko, Nevada

► **PC MAGAZINE** MultiBoot allows you to choose among different versions of DOS when your system boots, and it is a very popular utility. *PC Magazine* contributing editor Doug Boling has updated the program to work properly with DOS 5.0. MultiBoot Version 1.1 is available in Library 2 (PCMag Utils) of the Utilities/Tips Forum on PC MagNet. The filenames are MBOOT.COM for just the executable program and MBOOT.ZIP for the program, source code, and documentation files. Or you can send a postcard with your name, address, and preferred disk size to the attention of Katherine West, Advisor, *PC Magazine*, One Park Ave., New York, NY 10016.

Tracking Files

I have a 40MB hard disk with more than 1,200 files on it as well as software such as PC Tools, Quicken, fax and accounting packages, and others. I'm sure I don't use all those files in the course of my comput-

ing activities. So I'd like to find a package that could tell me what files were accessed in a certain period of time. I could, for example, see which files are not used in the course of a year and delete them to free up disk space. Do you know of any packages that do this?

Andre Boulanger
Dolbeau, Quebec
Canada

► **PC MAGAZINE** *PC Magazine* printed a utility in the May 7, 1988, issue that tracks which files are opened during the course of a session. RECORDER is a TSR (terminate and stay resident) program that creates a list of up to 200 files that have been opened and keeps it in memory. The number of files tracked can be extended to 2,000 by a command line parameter, though the program will take up more RAM to store the larger table. Using DOS's standard redirection commands, you can store the results of a RECORDER session in a text file at any time for later analysis.

You can find RECORDER in Library 2 (PCMag Utils) of the Utilities/Tips Forum on PC MagNet. The filenames are RECORD.COM for the executable and RECORD.ZIP for the complete program, source code, and documentation. Or you can send a postcard with your name, address, and preferred disk size to the attention of Katherine West at *PC Magazine*.

PC-Sentry (Solid Oak Software, P.O. Box 6826, Santa Barbara, CA 93160; 805-967-9853, 800-388-2761; single-user version, \$69; unlimited network users, \$195) is a commercial program that's more sophisticated than RECORDER; it supports the tracking of different levels of file activities. Rather than keeping the in-

formation in memory, PC-Sentry creates activity logs in plain text format, stored in a subdirectory on the hard disk. It automatically writes the logs to the disk while other disk-writing activities are taking place, so its operation is virtually transparent to the user. Two versions are included in the package: a full version that uses 24K of RAM and logs every system activity, including keystroke counts; and a light version that takes 10K of RAM and only logs file actions (opens, deletes, and so forth). Other utilities are included that let you examine, archive, and add comments to log files, and to time specific events such as how long a particular program was active. PC-Sentry is available from Solid Oak—a shareware version is available from Library 16 (GEN UTILS) of the Utilities/Tips Forum on PC MagNet as SENTRY.ZIP.

Update

In the March 17, 1992, Advisor column I mentioned the book *The C Programmer's Guide to Serial Communications*, published by Howard Sams. Since I wrote that column, Howard Sams merged with Macmillan Inc., and the old address is no longer valid. The new address is 11711 N. College Ave., Carmel, IN 46032; 317-573-2677. The book is still in print, so you should be able to get a copy. □

IN THIS SECTION

Tutor 423
User-to-User 427
Spreadsheets 437
The Working Word 451
Connectivity 453

ASK THE ADVISOR

Send your question to PC Advisor, One Park Ave., New York, NY 10016, MCI mailbox PC MAGAZINE, or upload it to PC MagNet (see the instructions for joining on page 12 of this issue).

FROM DESKTOPS TO



GREAT PRICES ON GREAT SYSTEMS!

When you buy direct from Tangent Computer, you get the best systems your money can buy. Like the fully-configured Model 450e with its Nice USA motherboard and SIS EISA chipset - the only 50MHz 486 to receive InfoWorld's Recommended Product Seal!

"The 450e includes top-notch support, and it comes at a reasonable price."
INFOWORLD, June 29, 1992

Tangent systems are consistently top-rated. Performers that go the extra distance - with superior customer support *during and after the sale*. 6 Editor's Choice Awards in the last 2 years prove it. You get unbelievably low prices and incredible support - the maximum return for your investment!

NOW TANGENT OFFERS YOU MORE!

Take a close look and you'll see that there's a Tangent that fits every need. From home office, CAD and document image processing to UNIX workstations and Novell servers - there's a Tangent that's just right for you. And, now you get a choice of operating systems, with OS/2 or Windows 3.1, expertly installed and ready to go at no additional cost.

Plus, all Tangent systems configured for UNIX and Novell come with operating systems installed and properly configured by certified SCO and NetWare experts.



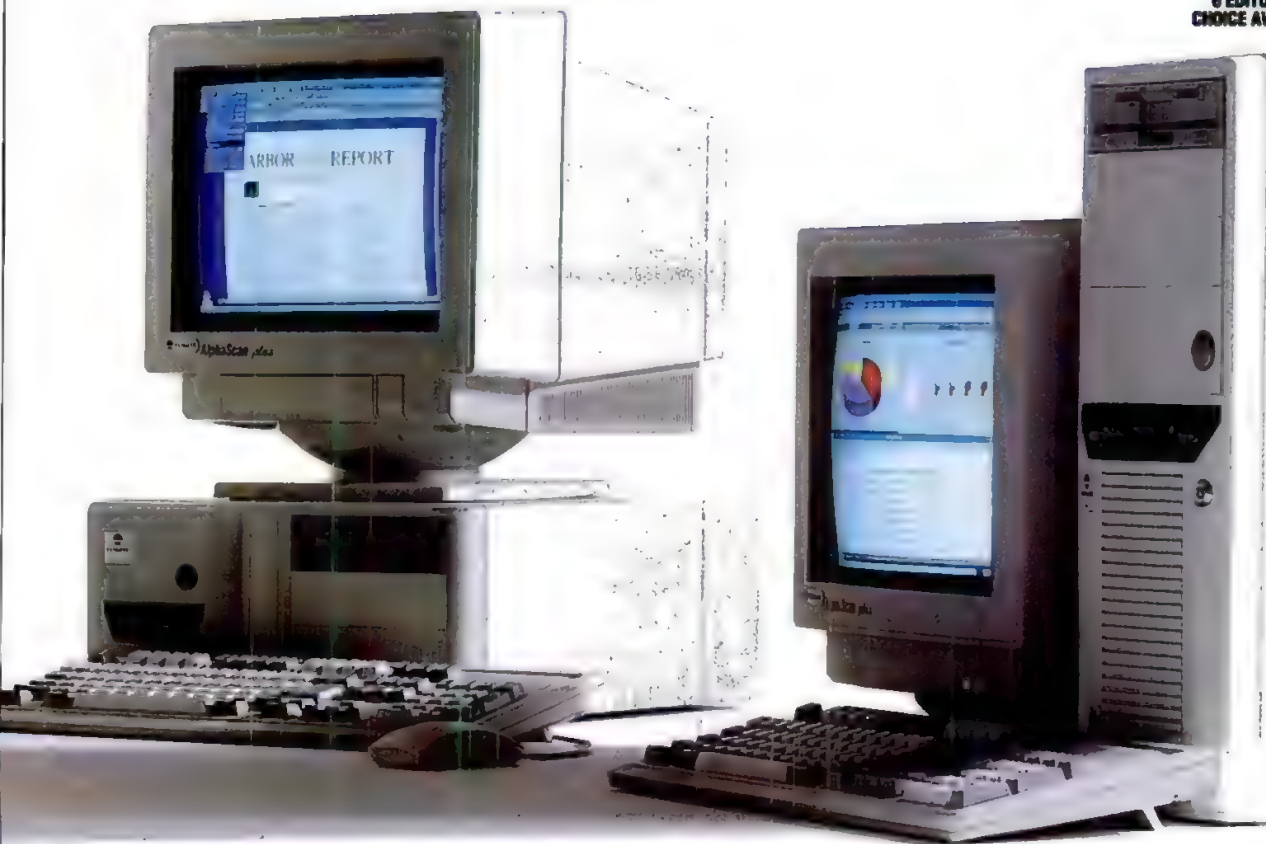
NEW LOWER PRICES! PACKAGE #1 & #2 INCLUDE 80 SUPER VGA MONITOR	1386/25 SX	1386/33	1486/25 SX-ISA	1486/33 ISA	1486/50 ISA	1486/33 EISA/SCSI	1486/50 EISA/SCSI
TANGENT PACKAGE #1 4MB RAM • 80MB HDD • SUPER VGA • MOUSE • OS/2 OR WINDOWS	\$1,450	\$1,550	\$1,695	\$1,895	\$2,195	\$2,995	\$3,195
TANGENT PACKAGE #2 8MB RAM • 200MB HDD • S-3 GRAPHICS • MOUSE • OS/2 OR WINDOWS	\$2,050	\$2,150	\$2,195	\$2,495	\$2,795	\$3,595	\$3,795
TANGENT MULTI-SERVER™ MAXIMUM SERVER PERFORMANCE UTILIZING HIGH-SPEED DISK ARRAY • CALL US FOR A TOTAL TANGENT SOLUTION! • MULTI-SERVER PRICES STARTING AT:							\$9,995

486 and OS/2 are trademarks of Intel Corporation. All other trademarks are owned by their respective companies. All prices subject to change without notice. © COPYRIGHT 1992 TANGENT COMPUTER CORPORATION TC 9/92B

FILE SERVERS



6 EDITORS' CHOICE AWARDS!



MORE PERFORMANCE - MORE SUPPORT!

Tangent systems give you lots more than just the latest in technology and performance. With every Tangent you get:

- Our 30-Day Money-Back Guarantee
- On-Site Service
- Air-Shipment of Replacement Parts
- Toll-Free Technical Support
- Special Additional Service Options



For incomparable, realistic graphics - 5-times faster than Super VGA:

- Tangent S-3 GUI/Windows Accelerator*



Plus, with Tangent you can also get the software of your choice, pre-loaded in your system and available at rock-bottom *Tangent Direct* prices. Your system and your software... for one great price!

* Optional feature at slight additional cost.

BUY A TANGENT SOLUTION!

For almost five years, Tangent has consistently provided its customers with award-winning systems that always feature the latest in technology - delivered with superior customer support - at amazingly affordable prices. Editors and satisfied customers nationwide agree... Tangent has the best solution for your computing problem... for less!

Make your move to Tangent today!

1-800-466-3300



TOLL FREE



CORPORATE PURCHASE ORDERS WELCOME • GSA# GS00K91AGS5212
197 AIRPORT BOULEVARD, BURLINGAME, CA 94010 • 415/342-9388 • FAX 415/342-9380



TANGENT

C O M P U T E R

The Ultimate Power Platforms.

For 486 Windows and CAD - Comtrade's EISA or Local Bus.

486 EISA Win-Station

- 64K Super Fast Write-Back Cache SRAM
- 4MB RAM & Built-in 487 Math Coprocessor
- 2MB 5.25" & 44MB 3.5" Floppy Drives
- 32-Bit EISA Hard Disk Controller 350% faster DTR
- 40MB 5ms IDE Drive with 64K Cache
- Diamond Stealth S3 Graphics Accelerator w/ 1MB VRAM up to 25 times faster than standard super VGA
- 4 Non-interlaced 28mm SVGA Color Monitor VESA Standard for 72Hz Flicker-Free Display
 - 2 Serial Parallel & Game Ports
 - Enhanced 10-Key Keyboard
 - Hi-Resolution 400DPI Serial Mouse
 - Microsoft DOS 5.0 & Windows 3.1

486/33 DX \$2245
486/50 DX2 \$2425
486/50 DX \$2625
486/66 DX2 \$2825

- 8MB RAM & 2.0MB Drive Upgrade Add \$360
- 5" MAG Flat Screen 1280x1024 Monitor Add \$290

Local Bus Win-Station

- 64K Super Fast Write-Back Cache SRAM
- 4MB RAM & Built-in 487 Math Coprocessor
- 2MB 5.25" & 44MB 3.5" Floppy Drives
- 40MB 5ms IDE Drive with 64K Cache
- 32-Bit Local Bus Super S3 Graphics Accelerator with 1MB VRAM up to 280x1024 & up to 32K Colors up to 50 times faster than standard super VGA
- 4 Non-interlaced 28mm SVGA Color Monitor VESA Standard for 72Hz Flicker-Free Display
 - 2 Serial Parallel & Game Ports
 - Enhanced 10-Key Keyboard
 - Hi-Resolution 400DPI Serial Mouse
 - Microsoft DOS 5.0 & Windows 3.1

486/33 DX \$1925
486/50 DX2 \$2125

- 8MB RAM & 2.0MB Drive Add \$360
- 32-Bit Local Bus Hard Disk Controller Add \$90

Local Bus CAD-Station

- 64K Super Fast Write-Back Cache SRAM
- 8MB RAM & Built-in 487 Math Coprocessor
- 2MB 5.25" & 44MB 3.5" Floppy Drives
- 2.0MB 5ms IDE Drive with 64K Cache
- 32-Bit Local Bus Super S3 Graphics Accelerator with 1MB VRAM up to 280x1024 & up to 32K Colors up to 50 times faster than standard super VGA
 - AutoCAD Display List Driver
- 7" Flat Screen 280x1024 SVGA Monitor
- 2 Serial Parallel & Game Ports
- Enhanced 10-Key Keyboard
- Hi-Resolution 400DPI Serial Mouse
- Microsoft DOS 5.0 & Windows 3.1

486/33 DX \$2875
486/50 DX2 \$3075

- Adobe System with 12"x12" Digitizer Add \$330
- 32-Bit Local Bus Hard Disk Controller Add \$90



W

HEN IT COMES TO HIGH-SPEED EISA PERFORMANCE,

COMTRADE IS FURIOUSLY BLOWING AWAY THE COMPETITION. "A VERY SWIFT GRAPHICS MACHINE," SAYS COMPUTER SHOPPER (MAY 1992). AND THIS HURRCANE EISA POWER IS FINALLY AVAILABLE TO YOU AT A PRICE THAT WON'T BLOW YOU AWAY. THESE EISA SYSTEMS FEATURE A POWERFUL 32-BIT EISA HARD DISK CONTROLLER THAT PROVIDES REAL 32-BIT ACCESS TO THE HARD DRIVE. THE RESULT IS A 350% FASTER DATA TRANSFER RATE (DTR). COMTRADE 486 EISA SYSTEMS - THE ULTIMATE MACHINE THAT LETS YOU TAKE YOUR WORK LOAD BY STORM.

486 EISA Advantage

- 64K Super Fast Write-Back Cache SRAM
- 4MB RAM & Built-in 487 Math Coprocessor
- 2MB 5.25" & 44MB 3.5" Floppy Drives
- Optional 32-Bit EISA Hard Disk Controller \$140
- 80MB 5ms IDE Drive with 64K Cache
- 6 Bit Local Bus SVGA Card with 1MB RAM
- 4 Non-interlaced 28mm SVGA Color Monitor VESA Standard for 72Hz Flicker-Free Display
 - 2 Serial Parallel & Game Ports
 - Enhanced 10-Key Keyboard
 - Hi-Resolution 400DPI Serial Mouse
 - Microsoft DOS 5.0 & Windows 3.1

486/33 DX \$1945
486/50 DX2 \$2125
486/50 DX \$2325
486/66 DX2 \$2525

- 8MB RAM & 2.0MB Drive Upgrade Add \$360
- 5" MAG Hard Drive & EISA Controller Add \$90

Local Bus SVGA

- 64K Super Fast Write-Back Cache SRAM
- 4MB RAM & Built-in 487 Math Coprocessor
- 2MB 5.25" & 44MB 3.5" Floppy Drives
- 40MB 5ms IDE Drive with 64K Cache
- 32-Bit Local Bus Super S3 Graphics Accelerator with 1MB RAM up to 280x1024 & up to 32K Colors up to 50 times faster than standard super VGA
- 4 Non-interlaced 28mm SVGA Color Monitor VESA Standard for 72Hz Flicker-Free Display
 - 2 Serial Parallel & Game Ports
 - Enhanced 10-Key Keyboard
 - Hi-Resolution 400DPI Serial Mouse
 - Microsoft DOS 5.0 & Windows 3.1

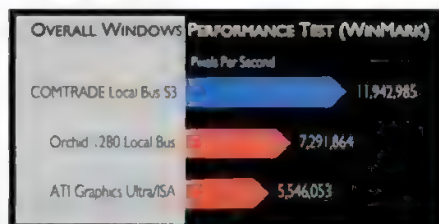
486/33 DX \$1775
486/50 DX2 \$1975

- 8MB RAM & 2.0MB Drive Add \$360
- 32-Bit Local Bus Hard Disk Controller Add \$90

Comtrade Local Bus Wins Big!

In Comparison With Other Leading High Performance Super VGA

INTRODUCING COMTRADE'S 32-BIT LOCAL BUS. TRADITIONALLY, 486 ISA MACHINES COULD ONLY SUPPORT 16-BIT VIDEO CARDS AND RUN AT STANDARD 8MHz BUS SPEED. THAT WOULD RESULT IN A BOTTLENECK REGARDLESS OF HOW FAST THE CPU COULD RUN. NOW YOU HAVE AN ALTERNATIVE. COMTRADE'S LOCAL BUS SYSTEM USES A 32-BIT VIDEO CARD WHICH NOT ONLY PROVIDES DOUBLE THE DATA PATH, BUT ALSO THE VIDEO BUS RUNS AT TRUE CPU SPEED. THE RESULT IS VIDEO SPEED UP TO 5X FASTER THAN REGULAR SVGA AND UP TO 50X FASTER WITH OUR LOCAL BUS S3 VRAM GRAPHICS ACCELERATOR.



Source: COMPUTER SHOPPER, MAY 1992, Local Bus Wins Big! Page 64



1.800.969.2123

COMTRADE

"Where Quality is Everything"

International 8 896 6688
Japan 0473 343 700
Fax 810 69 419
Hours 7:00-7:30 Pacific Mon-Fri
9:00-6:00 Pacific Sat
1534 East Valley Boulevard
City of Industry, California 91746

CIRCLE 316 ON READER SERVICE CARD

30 Day Money Back Guarantee, 3 Year Limited Two Year Parts Warranty
One Year On-Site Nationwide Service.

TUTOR

Patching DISKCOPY: The addition of an audible disk-swap prompt makes DISKCOPY even easier to use

BY JEFF PROSISE

Patching DISKCOPY

Is there a simple way to patch DISKCOPY so that it beeps when floppy disks need to be changed? This way I wouldn't have to stare at the screen waiting for the program to ask for the source and target disks when I duplicate floppy disks in the same drive.

*Christopher H. Stout
Wichita, Kansas*

► **PC MAGAZINE** You're right. An audible disk-swap prompt—especially when the source and destination drives are the same—would certainly be convenient when you're using DISKCOPY. You can accomplish the modification easily with DEBUG.

Switch to the directory on your hard disk where DOS files are stored. Make a backup of DISKCOPY.COM *before* starting so you'll have a copy of the original if something goes wrong.

If you're using DOS 5.0, alter DISKCOPY by running the commands shown below. The first one should be executed at the DOS prompt, the others at the DEBUG hyphen:

```
DEBUG DISKCOPY.COM
E 18C0 07
E 18E8 07
W
Q
```

Follow the same sequence to patch the DOS 4.0 version of DISKCOPY, but substitute 1957 and 197B for 18C0 and 18E8, respectively. For Version 3.3, patch just the byte at 1071. A colon will no longer appear after the drive letter when DISKCOPY prompts you to insert a disk, but that's the only side effect you'll notice.

How does this work? The text of the messages "Insert SOURCE diskette in

drive x:" and "Insert TARGET diskette in drive x:" is stored within DISKCOPY.COM. Before displaying either message, DISKCOPY fills in the missing drive letter. Next, it writes the result to the standard output device, which by default is the computer screen. All we're doing is using DEBUG to replace the colon following the drive identifier with an ASCII 7, which produces a tone when written to standard output.

Why must we *replace* a character of the message? Why not just add it to the existing code? That would seem a better way to go. Yet doing so would cause all subsequent instructions to move, bumping information the program expects to find at certain locations to new, unknown addresses. You can add audible prompts to the text of other DOS commands (such as FORMAT when it asks if you want to format another disk) using a similar procedure. The only thing you need is the correct patch-point address.

To determine the patch-point addresses for other DOS utilities, load the .COM or .EXE file into DEBUG and use either the D (Dump) or S (Search) command to find the text you want to change. (If you edit an .EXE file, you'll need to give it another extension first; otherwise, DEBUG won't allow you to write the file back to disk. After editing is completed, restore the original name.) D is the brute-force method; each time you enter it at the DEBUG prompt, another 128 bytes of the file is displayed. The offset of the first byte in a row shows to the left of the screen in segment:offset notation (4606:0140, for example). The actual bytes (in hexadecimal form) follow, with their ASCII equivalents displayed to the extreme right.

S provides a more elegant means for hunting down a specified text string. If the program is 4,096 bytes long (1000

hex), for example, the command

```
S 0100 L 1000 "Insert"
```

will list all addresses at which the word "Insert" appears. Note that searches are case-sensitive, so "Insert" is not the same as "insert". Also, any numbers you enter in DEBUG must be hex, since the program always thinks in that format.

One tip: Type RCX at the DEBUG prompt to find the length, in bytes, of a file shorter than 64K. For a longer one, RBX reveals the number of complete 64K segments in the file, and RCX indicates the bytes remaining. A 69,000-byte file, for example, will show 1 for RBX and D88 for RCX. (Unfortunately, searching files longer than 64K is messy with DEBUG.)

When you've determined the location to change, you can view the contents of the file at that point by typing D followed by the address. Use DEBUG's E (Enter) command as shown above to modify the strings at the patch points. Type W to save the modified file and then type Q to quit.

See your DOS manual for more documentation on these and other DEBUG commands. □

ASK THE TUTOR

The Tutor solves practical problems and explains techniques for using your hardware and software more productively. Questions about DOS and systems in general are answered here. Send your question to Tutor, *PC Magazine*, One Park Ave., New York, NY 10016, or upload them to PC MagNet. We regret that we are unable to acknowledge submissions or answer letters individually.

How a Bigger Presence Translated



"Growth has allowed us to make a greater investment in technical support," says Mike Zabaneh, vice president and co-owner of Tangent Computers.

"At this point we've got a staff of engineers dedicated to support, and we've been able to branch out beyond general support to specialized support for Unix and Novell networks."

Offering better customer services isn't the only benefit of Tangent's success. "We've taken advantage of increased sales to put more and more into R & D, and to improve the quality and reliability of the computers we produce. Judging by some of the good reviews we've gotten, it's paying off."

In PC Magazine Into Better Service for Tangent's Customers

Zabaneh attributes his greater share of the direct market to his advertising in PC Magazine. "PC Magazine is our single largest lead generator. Even better, the lifetime value of the customers we get through PC Magazine is unmatched. They buy from us again and again, through later magazine ads and through our catalog.

"What impresses me most about PC Magazine readers is their loyalty to the magazine. They really depend on it. We have many repeat customers, people who are very familiar with Tangent, who still refer to our most recent ad in PC Magazine when they order."

Zabaneh is a big fan of the PC Direct section. "We had been in the general part of the magazine, and decided to try out PC Direct.

"There was absolutely no decrease in response, and the savings allowed

us to go from a single page to a spread in every issue. The return on investment has been excellent."

For direct marketers like Tangent, the only way to stay competitive is by increasing their share of the market. And that kind of growth can be achieved in only one place — PC Magazine. To find out how you can attract the most new customers with the greatest lifetime value at the lowest possible cost, call your PC Magazine or 212-503-5100 and ask about PC Direct.

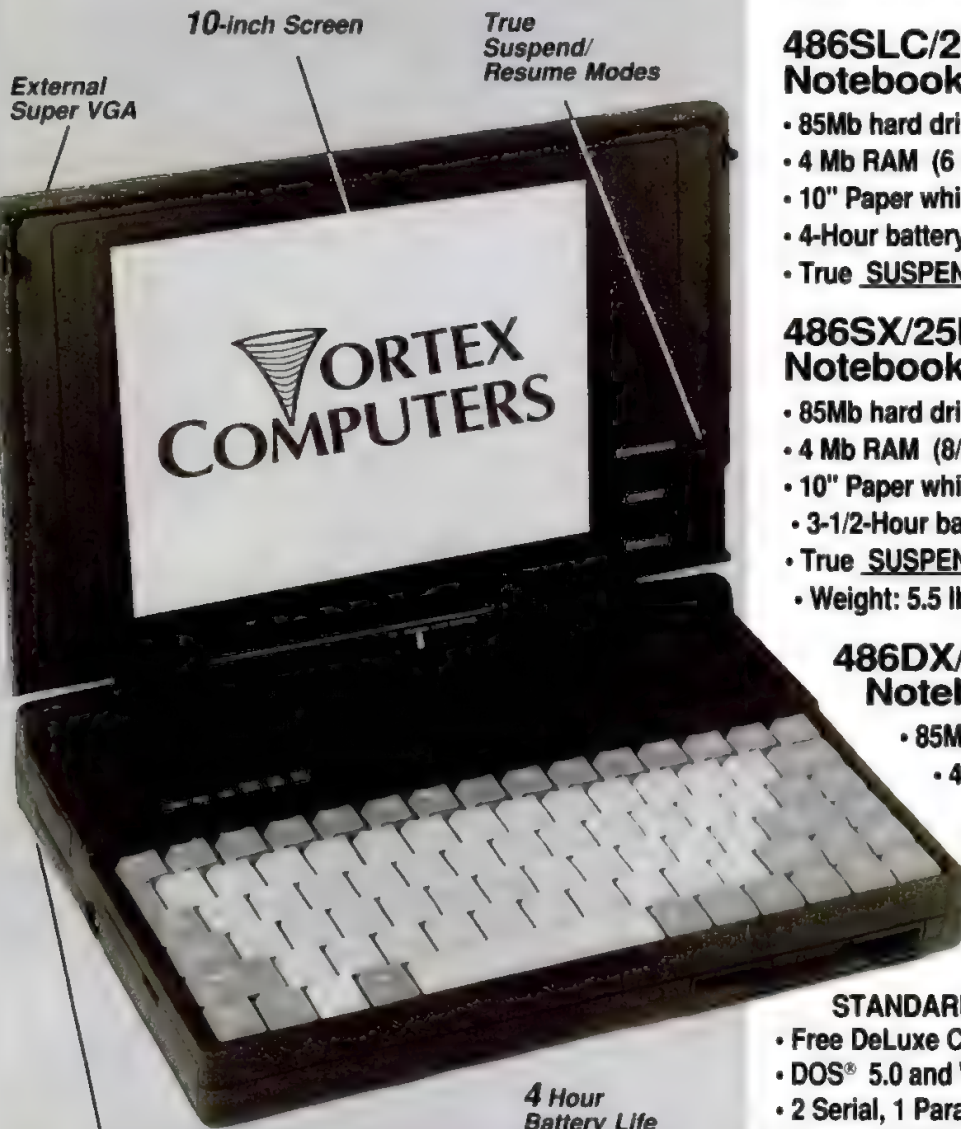


The Purchasing
Source for
Direct Buyers

486 Power On the go!

At Vortex, we build only notebook computers ...

And have the perfect solutions to meet your price and performance needs!



Optional 9600/2400
Fax/Modem
Send/Receive

486SLC/25MHz \$ 2,095. Notebook Computer (PICTURED)

- 85Mb hard drive (130 optional) 19 ms.
- 4 Mb RAM (6/8 optional) 70 ns.
- 10" Paper white 32 grey scale LCD
- 4-Hour battery life
- True SUSPEND/RESUME

486SX/25MHz \$ 2,450. Notebook Computer

- 85Mb hard drive (130 optional) 19 ms.
- 4 Mb RAM (8/20 optional) 70 ns.
- 10" Paper white 64 grey scale LCD
- 3-1/2-Hour battery life
- True SUSPEND/RESUME
- Weight: 5.5 lbs. with battery

486DX/33MHz \$ 2,695. Notebook Computer

- 85Mb hard drive (130 optional) 19 ms.
- 4 Mb RAM (8/20 optional) 70 ns.
- 10" Paper white 64 grey scale LCD
- 3-1/2-Hour battery life
- True SUSPEND/RESUME
- Weight: 5.5 lbs. with battery

STANDARD TO ALL MODELS:

- Free DeLuxe Carrying Case
- DOS® 5.0 and Windows™ 3.1 Installed
- 2 Serial, 1 Parallel Port
- External SVGA Port 800 x 600
- Ni-Cad Battery, Universal AC Adapter
- Full Keyboard Inverse T Cursor Keys and separate PGUP, PGDN, HOME, END Keys
- 3-1/2" Floppy, 1.44 Mb
- Docking Station Optional

VORTEX COMMITMENT:

At VORTEX we are committed to provide valuable solutions to all high-end portable computer needs at the lowest prices. To ensure the value of your purchase we guarantee to stand behind our notebooks with the following policies:

FULL 30-DAY MONEY-BACK GUARANTEE, 1-YEAR INSTANT REPLACEMENT WARRANTY, TOLL-FREE TECH SUPPORT LINE. We are pleased to accept all major credit cards.

Introducing:

386 COLOR

Call For
Prices
Today!



VORTEX COMPUTERS

2790 Windybush Road, Newtown, PA 18940

Call Today! Or FAX Your Order: (215) 825-4240

800-548-7839

Int'l. Orders Call: (215) 825-4095

USER-TO-USER

Easy Access to PIFs: View and edit all the properties of DOS programs under Windows **Updating Your PATH:** How to add or remove directories easily

BY NEIL J. RUBENKING

Easy Access to PIFs

You can access the Properties dialog box readily enough by pressing Alt-Enter, but the really important properties of an icon for a DOS program in the Program Manager are not so easily accessible. You have to get at them indirectly by running the PIF editor. Here's a trick that uses the Macro Recorder to access the PIF file directly from the icon, with or without the properties box.

Start the Macro Recorder and load the file where you keep your macros. If you don't already have a file of macros, save a new one as M.REC. Switch back to the Program Manager and select an icon that runs a program through a PIF file. Switch back to the Macro Recorder and choose Macro!Record.

Give your macro a name such as "Edit Progman Item's PIF & Properties." For the shortcut key, check Ctrl and Alt and choose Enter from the pull-down list of keys. Playback should be set to Same Application, and Speed to Fast. Check Enable Shortcut Keys, and set Record Mouse to Ignore Mouse.

Press Start to record your new macro and the Recorder will minimize and blink. Hit Alt-F and R to choose Run, type pifedit, and press Enter. Now hit Alt-Tab once to return to the Program Manager, where the icon you chose is still highlighted. Hit Alt-Enter to bring up the Properties dialog box and Tab to highlight the Command Line field. Press Ctrl-C to copy the name of the PIF file to the Clipboard. Next hit Alt-Tab once to switch back to the PIF Editor, then hit Alt-F and the letter O to open a file. Hit Ctrl-V to paste the PIF file name as the file to open, and hit Enter to bring it up.

Last, click on the Recorder icon with

the mouse and, at the dialog box, hit Enter to finish your macro. To make sure you don't lose your work, choose File! Save in the Recorder. Put M.REC on the Load= line in WIN.INI or make an icon for M.REC in your StartUp group, so the macro will always be available.

Anytime you want to see all the properties associated with an icon that runs a .PIF file, just highlight it and press Ctrl-Alt-Enter. You'll see both the Progman properties of the icon and its PIF file. A logical companion to this macro would be one where Ctrl-Enter brings up only the associated PIF file.

I hope other readers of *PC Magazine* like the macro. It's made my computer housekeeping easier.

David Friedman
Santa Cruz, California

► **PC MAGAZINE** The term *PIF file* is actually redundant, since *PIF* stands for *program information file*, but it's a common phrase. A PIF contains information that tells Windows about the requirements of a non-Windows program. Highlight the MS-DOS Prompt icon in your Main PROGRAM group and hit Alt-Enter; you'll see that the command line field contains DOSPRMPT.PIF. The PIF Editor utility lets you view and change the information stored in a PIF.

You can create the PIF-display macro by following the instructions above, or you can download PIFMACRO.REC (listed as PIFMAC.REC) from PC Mag-Net and merge it with your existing macro file. PIFMACRO.REC contains the macro described above, which displays the properties and PIF for a file. It also contains another macro that just displays the PIF, as Mr. Friedman suggests.

To create this second macro, start as

described above, but name the macro "Edit Progman Item's PIF." Set the shortcut key to Ctrl-Enter, and leave the rest of the checkboxes set as described above. Double-check that the highlighted icon in Program Manager is one whose command line refers to a PIF. Then start recording and enter

- Alt-Enter (bring up the Properties for the icon)
- Tab (highlight the Command Line field)
- Ctrl-C (copy the field to the Clipboard)
- Esc (put away the Properties dialog)
- Alt-F, R (run a file)
- pifedit
- Enter
- Alt-F, O (open a PIF)
- Ctrl-V (copy from the Clipboard)
- Enter

Click on the macro recorder icon and press Enter to stop recording, then save your work. Now, besides being able to press Alt-Enter to edit an icon's properties, you can press Ctrl-Enter to edit its PIF, or Ctrl-Alt-Enter to edit both!

Windows 3.0 users will have to make some minor changes to these macros. Replace Alt-Enter with Alt-F, P; Ctrl-C with Ctrl-Ins; and Ctrl-V with Shift-Ins.

Updating Your PATH

I've often wanted to add or remove directories from my PATH without having to type out the entire PATH variable each time. I wrote the batch file in Figure 1 to save myself from retyping all the directories I didn't want to change.

To add a new directory to the PATH, PATHEDIT.BAT reads the PATH variable from the environment and adds the new directory to the end. To remove a directory, the program again reads the

How PC Direct



Helps Insight With its Zero-Defect Goal

"Our goal is zero-defect, and it seems within reach," says Eric Crown, CEO of Insight. "We've made enormous improvements in the way we build and test systems and drives, and it's paid off. We've had entire days when not a single service call was related to a quality control problem.

"One of the keys to achieving zero-defect was to get our sales volume up. That allows us to use the highest quality components in the business. It also allows us to invest in the best quality control systems."

Insight is attracting a bigger and bigger share of the direct market, and that kind of growth can be achieved in only one place — PC Magazine.

"We believe in PC Magazine's PC Direct section," says Valerie Paxton, Insight's Vice President of Marketing.

"The results of our advertising in PC Direct have been so terrific — today a salesperson told me he had 22 straight phone calls from PC Magazine readers — that we decided to increase our advertising presence in every issue from three pages to eight! The impact on sales on all our products — systems, software and Hard Drives

International's mass storage products — has been phenomenal.

"PC Direct buyers can find our ads easily. They know that this is where they can shop efficiently. And we know that because these are PC Magazine readers, they are smart buyers whose companies depend on them to specify brands of PC products, over and over again.

"In other words, these are customers who are going to be very valuable to us in the long term.

"PC Magazine's PC Direct section is a big hit for buyers and for Insight."

If you're a direct marketer, there's only one sure strategy — to grow faster than the competition. And there's only one sure way to do it — PC Magazine. For more information on the PC Direct section call your PC Magazine sales representative or 212-503-5100.



The Purchasing Source for Direct Buyers

PATH variable and, using a FOR loop, checks each directory to see if it is the one to be removed.

At first I had a problem with the FOR command because it accepts only one command string after the DO component. So, rather than creating a separate batch file, I included a subroutine in PATHEDIT to handle the removal. If the directory in the PATH variable matches the one to be removed, the subroutine skips adding it to the tmp-path variable used to build the full path.

Another problem was that the directory to be removed needs to be entered exactly as it appears in the PATH statement—that is, in uppercase. I included a trick in the batch file, using the PATH

command itself to capitalize the directory name if it is entered in lowercase.

*Richard A. Davies
Aurora, Colorado*

► **PC MAGAZINE** Adding a directory to the PATH is easy; you just have to decide whether to add it at the beginning or the end of the list. For years I've used this simple ADDPATH.BAT file:

```
PATH %path%;%1
```

Removing a directory, though, is a bit more work. PATHEDIT uses the fact that the FOR command treats the semicolon as a delimiter in its input list. Create and run the following two-line batch file

to see this feature in action:

```
@ECHO OFF
FOR %%f IN (%PATH%) DO ECHO {%%f}
```

If you call PATHEDIT with the minus sign as its first parameter, the batch file tries to remove the directory that follows from the PATH. To do so, it first converts the requested directory to uppercase by saving the PATH, setting the PATH to the second parameter, copying the new PATH, and restoring the old PATH. DOS automatically converts the PATH to uppercase, so this maneuver has the effect of storing an uppercase copy of the %2 parameter in the variable *drop*.

Next, PATHEDIT uses a FOR loop to check each existing directory on the path against the directory in the drop variable. It does so by calling itself, with the first command line parameter set to sub and the second to the individual directory on the path. When called with sub as its first parameter, PATHEDIT immediately jumps to the label sub. Here, if the second parameter matches the drop variable, the program skips to the end. If the parameter doesn't match, it adds that parameter to the variable tmp-path. The effect is to build tmp-path from the individual components of the PATH, omitting the one selected for deletion.

I took the liberty of adding more reporting and error checking to PATHEDIT. After adding a directory to the PATH, it reports its success and displays the new value. If the user wants to drop a directory, it reports either that it was successful or that the requested directory was not present, then displays the new PATH. (Download PATHEDIT.BAT from PC MagNet as PATHED.BAT.) □

PATHEDIT.BAT

Complete Listing

```
@echo off
: PATHEDIT by Rich Davies, Aurora CO
if '%1'=='+' shift
if '%1'=='-' goto help
if '%1'=='-' goto drop
if '%1'=='sub' goto sub

: Optionally, put new dir first, path=%1;%path%
path=%path%;%1
ECHO %1 added.
: Display path
path
goto end

:drop
IF '%2'==' ' goto help
set removed=
set tmp-path=%path%
path=%2
set drop=%path%
: Now drop contains %2 capitalized
path=%tmp-path%
set tmp-path=
for %%a in (%path%) do call %0 sub %%a
path=%tmp-path%
set tmp-path=
IF '%removed%'==' ' ECHO %drop% not found
IF '%removed%'=='YES' ECHO %drop% removed
set drop=
set removed=
: Display path
path
goto end

:help
ECHO The options are:
ECHO %0 - directory : drops directory from path
ECHO.
ECHO %0 [+] directory : adds directory, '+' is optional
ECHO.
goto end

:sub
if %drop%==%2 SET removed=YES
if %drop%==%2 goto end
if '%tmp-path%'==' ' set tmp-path=%2
if %tmp-path%==%2 goto end
set tmp-path=%tmp-path%;%2
:end
```

Figure 1: This batch file lets you add and remove directories from your PATH without any retyping.

SHARE YOUR SECRETS

Reveal your latest DOS, Windows, and systems discoveries through the User-to-User column; we'll pay you \$50 for any submission that we print. Please submit your letter on-disk together with a printout. Mail your contribution to User-to-User, *PC Magazine*, One Park Ave., New York, NY 10016, or upload it to PC MagNet (see page 12 for access instructions).

STEP UP TO THE WORLD'S FIRST

i486DX **COLOR** NOTEBOOK

FOR ONLY **\$2,999**

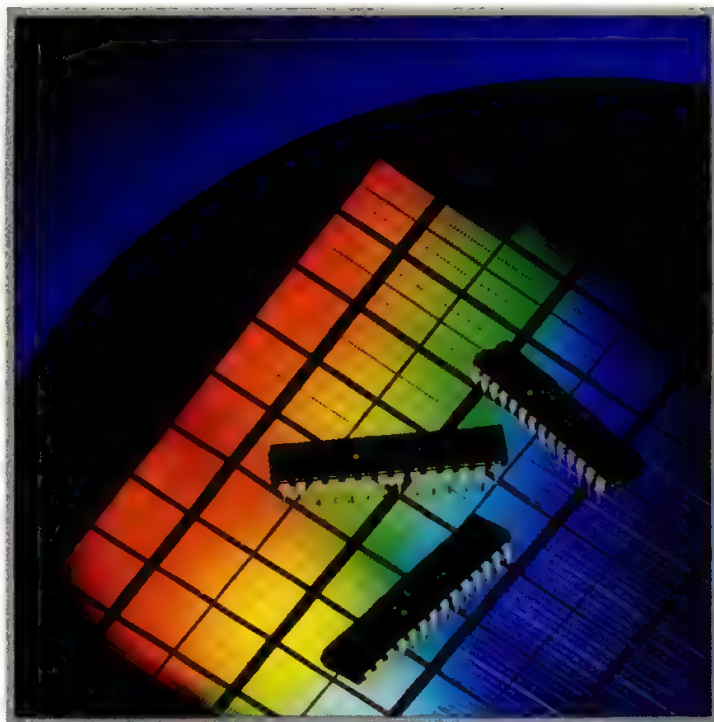


GET THE EDGE

EDGE
TECHNOLOGY INC.

800-438-3343

STEP UP TO THE EDGE...



LIGHTNING VIDEO PERFORMANCE

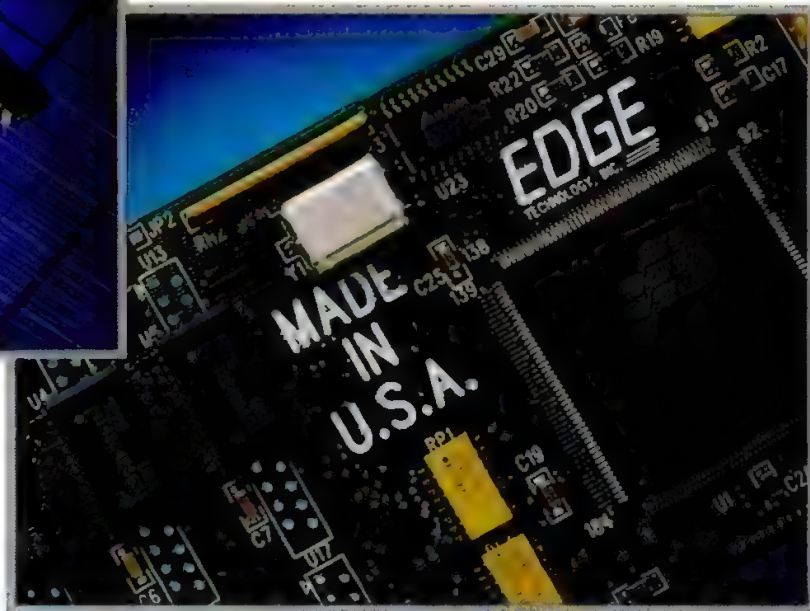
Using 2nd generation GUI Accelerators like S3's new 86C924 combined with AT&T's 24-Bit True-Color RAMDAC and 1MB of VRAM, our engineers have developed the V24 BitBlaster, providing 16.7 million simultaneous colors with significant performance improvements over earlier S3 based designs.

Upgrade your existing PC for only \$199

MEMORY TECHNOLOGY INNOVATION

With over 10 years experience in the semiconductor industry our sister company continues to set new standards for memory technology. Their state of the art design, wafer fabrication, assembly and test facilities allow us to design and manufacture our systems from the bare silicon up. Employing over 4000 people, of which 650 are engineers, this 1 million square foot facility produces DRAMs, VRAMs and more Fast SRAMs than any other company in the world.

Edge has applied these years of semiconductor and component manufacturing experience to develop the ultimate line of computers. Feature for feature the competition simply doesn't compare.



486SX/25 486DX/33 486DX2/66

UPGRADES

- Intel 486DX2 50MHz Upgradable
- Intel 486SX 25MHz Processor
- 8K Cache w/CoProcessor Socket
- 4MB of High Speed RAM
- 80MB 17ms IDE Hard Drive
- 1.44MB and 1.2MB Floppy Drives
- D24 BitBlaster GUI Accelerator
- 24-Bit True-Color w/ 1MB RAM, 16.7 Million Simultaneous Colors, Up to 1280 x 1024 Resolution
- MAG Non-Interlaced 14" Super VGA Color Monitor, .28mm 1024 x 768 Resolution, VESA
- Logitech Mouse and Pad
- 1 Parallel, 1 Game, 2 Serial Ports
- 101-Key Keyboard (130-Key Opt.)
- Microsoft DOS 5.0 Pre-loaded

\$1399

486SX/25	80MB	130MB	213MB
14" SVGA 1024i	\$1,319	\$1,369	\$1,519
14" SVGA 1024Ni	\$1,399	\$1,449	\$1,599
15" SVGA 1280Ni	\$1,599	\$1,649	\$1,799

- Intel 486DX2 66MHz Upgradable
- Intel 486DX 33MHz Processor
- 8K Cache and Math CoProcessor
- 256K 17ns Static RAM Cache
- 8MB of High Speed RAM
- 130MB 15ms IDE Hard Drive
- 1.44MB and 1.2MB Floppy Drives
- D24 BitBlaster GUI Accelerator
- 24-Bit True-Color w/ 1MB RAM, 16.7 Million Simultaneous Colors, Up to 1280 x 1024 Resolution
- MAG Non-Interlaced 14" Super VGA Color Monitor, .28mm 1024 x 768 Resolution, VESA
- Logitech Mouse and Pad
- 1 Parallel, 1 Game, 2 Serial Ports
- 101-Key Keyboard (130-Key Opt.)
- Microsoft DOS 5.0 Pre-loaded

\$1899

486DX/33	130MB	213MB	340MB
14" SVGA 1024Ni	\$1,899	\$2,049	\$2,399
15" SVGA 1280Ni	\$2,099	\$2,249	\$2,599
17" SVGA 1280Ni	\$2,699	\$2,849	\$3,199

- Intel 486DX2 66MHz Processor
- 8K Cache and Math CoProcessor
- 256K 17ns Static RAM Cache
- 8MB of High Speed RAM
- 213MB 15ms IDE Hard Drive
- 1.44MB and 1.2MB Floppy Drives
- D24 BitBlaster GUI Accelerator
- 24-Bit True-Color w/ 1MB RAM, 16.7 Million Simultaneous Colors, Up to 1280 x 1024 Resolution
- MAG Non-Interlaced 14" Super VGA Color Monitor, .28mm 1024 x 768 Resolution, VESA
- Logitech Mouse and Pad
- 1 Parallel, 1 Game, 2 Serial Ports
- 101-Key Keyboard (130-Key Opt.)
- Microsoft DOS 5.0 Pre-loaded

\$2599

486DX2/66	130MB	213MB	340MB
14" SVGA 1024Ni	\$2,449	\$2,599	\$2,949
15" SVGA 1280Ni	\$2,649	\$2,799	\$3,149
17" SVGA 1280Ni	\$3,249	\$3,399	\$3,749

16MB Upgrade \$199

Upgrade from 8MB to 16MB

8MB Upgrade \$99

Upgrade from 4MB to 8MB

V24 BitBlaster \$99

S3 86C924 GUI Accelerator with AT&T 24-Bit True-Color RAMDAC and 1MB VRAM, 16.7 simultaneous colors, up to 1280x1024 resolution

FAX /Modem 9624 \$49

Send & receive w/MNP5 and QuickLink II

CD-ROM Drive \$299

w/ Microsoft Bookshelf
 - Columbia Encyclopedia
 - The World Almanac
 - American Dictionary
 - Roger's Thesaurus
 - Book of Facts & Quotes

MS Windows 3.1 \$49

Upgrades available at time of system purchase only.

Made in the U.S.A.

OF TECHNOLOGY

THE PRICE/ PERFORMANCE LEADER

The two basic questions most people ask themselves when buying a computer are "How much bang for the buck?" and "What about service and support?". Unfortunately most computer companies do an adequate job of only one or the other. Edge provides you with the highest price / performance value available without sacrificing the service and support you deserve. You no longer have to choose one or the other.

AWARD WINNING COMPONENTS

In addition to our Ultra-Fast 17ns SRAMs and high performance board level products, we use award winning brand name components like genuine Intel processors, MAG Innovision monitors, Maxtor hard drives and Logitech mice.



486DX/50 LOCAL BUS EISA SERVER

800-438-3343

- Intel 486DX 50MHz Processor
- 8K Cache and Math CoProcessor
- 256K 17ns Static RAM Cache
- 16MB of High Speed RAM
- 32-Bit EISA SCSI Controller (Caching Controller optional)
- 340MB 13ms SCSI Hard Drive
- 1.44MB and 1.2MB Floppy Drives
- 32-Bit Local Bus GUI Accelerator S3 based with 1MB of VRAM
- MAG Non-Interlaced 14" Super VGA Color Monitor, .28mm 1024 x 768 Resolution, VESA
- Logitech Mouse and Pad
- 1 Parallel, 2 Serial Ports
- 101-Key Keyboard (130-Key Opt.)
- Microsoft DOS 5.0 Pre-loaded

\$3999

486DX 50	340MB	660MB	1.2GB
14" SVGA 1024N	\$3,999	\$4,499	\$4,899
15" SVGA 1280N	\$4,199	\$4,699	\$5,099
17" SVGA 1280N	\$4,799	\$5,299	\$5,699



- SAME DAY SHIPPING ON MOST SYSTEMS
- 30 DAY RISK-FREE MONEY BACK GUARANTEE
- ONE YEAR EXPRESS PARTS REPLACEMENT
- LIFETIME TOLL-FREE TECHNICAL SUPPORT
- ONE YEAR ON-SITE SERVICE OR SYSTEM REPLACEMENT

ON-SITE SERVICE

EDGE
TECHNOLOGY, INC.

MON-FRI 7AM - 7PM,
SAT 8AM - 2PM(MST)

815 E. Karcher Road - Nampa, Idaho 83687
(208) 465-3434 - FAX (208) 465-3424

©1992 Edge Technology, Inc. All rights reserved. All prices and specifications subject to change without notice. Edge Technology, Inc. cannot be responsible for omissions, errors in typography or photography. Intel and Intel Inside are registered trademarks of the Intel Corporation. All other company trademarks are trademarks of their respective companies. Prices do not include shipping or handling. Edge Technology, Inc. reserves the right at its sole discretion to either dispatch on-site service or replace systems. On-site service provided by third party carriers and may not be available in some remote locations. 30 day risk-free money back guarantee does not include return freight or shipping and handling charges and applies only to Edge brand products. All returns require RMA numbers and must be shipped in the original condition packed and insured.

CIRCLE 119 ON READER SERVICE CARD

We're droppin to take ca



At PCs COMPLETEAT, we offer
you major brands at major discounts. Which is

something nobody else in this business does. We also provide service and support that's second to none. Example: We'll ship you any of over fifty standard computer systems the same day. Or any custom configuration within 48 hours. With software already loaded.



LEADING EDGE
a Daewoo Telecom Company

20MHZ 386SX

- 2MB RAM expandable to 4MB
- 84MB hard drive
- 1.44MB and 1.2MB floppy drives
- DOS 5.0, Works, Windows

\$849

• 130MB hard drive configuration
\$899

17 Leading Edge models available
Monitors extra

\$849



PACKARD BELL
America grew up listening to us. It still does.

25MHZ 386SX

- 2MB RAM, 10"MB hard drive
- 1.44MB and 1.2MB floppy drives
- Extended VGA, 1024 x 768
- 2400bps modem and mouse

\$1029

33MHZ 486DX

- 4MB RAM, 8K cache expandable
- 130MB hard drive, 20ms

\$1799

8 Packard Bell models available
Monitors extra

\$1029



EVEREX
EVEN for Excellence

25MHZ 386SX

- 2MB RAM expandable to 8MB
- 80MB hard drive

\$1099

50MHZ 486DX2

- 4MB RAM expandable to 64MB
- 128K cache expandable to 256K
- Upgradeable CPU module

\$2049

- 1.44 MB floppy, MS-DOS 5.0, Windows 3.1 included

24 Everex models available
Monitors extra

\$1099

Prices change frequently. When you call PCs COMPLETEAT, you'll always get the best available price. We carry a full line of computer products from Everex, Leading Edge, Packard Bell, Texas Instruments, Toshiba, Epson, Okidata, Intel, Microsoft, Mountain, and many other fine suppliers, plus © PCs COMPLETEAT. All prices are subject to change, and do not include shipping. Leading Edge is a trademark of Daewoo Telecom Corporation. Packard Bell is a trademark of Packard Bell Electronics, Inc. and is not affiliated with any former Bell system entity. Everex is a trademark of Everex Systems, Inc.

g everything re of you.

What's more, we provide toll-free technical support and on-site warranty service. So give us a call today. And don't be alarmed if you hear a loud noise. All it means is that we just dropped everything to handle your order. *Now open 10 a.m.-6 p.m. Sat. and 12-6 p.m. Sun.*

PCs COMPLEAT

Real Service ♦ Unreal Prices

1-800-669-4727



25MHZ 386SL

- 2MB RAM, 32KB cache
- 60MB hard drive, SCSI-2 port
- 10" supertwist sidelit screen

\$1899

25MHZ 386SL LEGAL SIZE

- 80MB hard drive, modem
- Numeric keypad, trackball

\$2199

25MHZ 386SL COLOR

- 60MB hard drive
- 9" passive matrix LCD, 256 colors

\$2799

10 Leading Edge models available
Lease for \$71.59/mo.

\$1899



TOSHIBA

T2200SX

- 386SX/20, 2MB RAM
- 80MB hard drive, DOS 5.0

\$2189*

T3300SL

- 386SL/25, 2MB RAM
- 80MB hard drive, DOS 5.0

\$2439*

T4400SX COLOR

- 486SX/25, 2MB RAM
- 80MB hard drive, DOS 5.0

\$4889

13 Toshiba models available

Lease for \$82.53/mo.

* Limited time offer

\$2189



TEXAS INSTRUMENTS

TM4000 WinSX

- 486SX/16, 4MB RAM
- 80MB hard drive
- Weight 5.6 LBS
- DOS 5.0, Windows 3.1

\$2599

- 486SX/25MHZ
- 120MB hard drive

\$3099

6 Texas Instruments models available
Lease for \$97.98/mo.

\$2599

all major software brands. Lease prices reflect 36 month operating lease available to approved business customers. PCs COMPLEAT, 495 Technology Center West, 34 St. Martin Drive, Marlborough, MA 01752, Telephone: 1-800-669-4727, Fax: 1-800-669-8329, 9 a.m.-9 p.m. (EDT) Mon-Fri.

WINSX and Texas Instruments are trademarks of Texas Instruments, Inc. MS-DOS, Windows and Word are trademarks of Microsoft Corporation. Toshiba is a trademark of Toshiba America Information Systems, Inc. All other products or brand names are trademarks of their respective companies.

Arlington Computer Products... Great Prices and Service Since 1984!

- PC Magazine "...Arlington offers worry-free mail order purchasing!"
- PC Sources Product Review "...You can be confident that what you order will work as soon as it arrives!"
- PC Computing Phantom Shopper "...Courteous service and terrific technical support!"

HEWLETT-PACKARD

Laserjet III w/Toner	\$1499
60 MG. VGA	\$809
Laserjet IIP+ w/Toner	\$1049
Laserjet III SL w/Toner	\$3499
1MG Upgrade	\$79
2MG Upgrade	\$109
4MG Upgrade	\$179
Extra Toners	\$79
Deskjet 500/500C	\$399/699
Pacific Page/XL	\$269/\$639
Pacific Data 25 in 1 Font	\$249
PacData Deskjet 25 in 1	\$99

PANASONIC

1123	\$199	1654	\$519
11241	\$275	2624	\$365
2123	\$239	4410	\$635
2124	\$319	4430	\$889
2180	\$179	44501	\$1079
1624	\$339	4455	\$1719
4420/44501	2 MG.		\$149

CITIZEN

GS140	\$299	GS200	\$159
GS145	\$369	PN 48	\$329

OKIDATA

ML320	\$309	ML393	\$919
ML321	\$435	ML393C	\$979
ML380	\$219	PM3410	\$1299
ML390	\$435	OL400	\$599
ML391	\$579	OL810	\$1049

CANON

BJ-10EX	\$289	BJ-20EX	\$369
BJ-300	\$409	BJ-330	\$559
BJC-800	\$1799	BJC-820	\$1929



ML-390

EPSON PRINTERS

LX810	\$169	LQ570	\$259	LQ1070	\$369	EPL 8000	\$1289
FX850	\$289	LQ860	\$549	LQ1170	\$579	DFX5000	\$1269
FX1050	\$375	LQ870	\$429	LQ2550	\$849	DFX8000	\$2139

Action 2250	\$139
Action Laser II	\$679
Action 150 Fonts	\$59

NO SURCHARGE FOR CHARGE CARDS!

NOTEBOOKS

Librex 386 SX20	
60 MG. VGA	\$1549
AST 43V, 386, 40 MG	\$2049
AST 63V, 386, 60 MG	\$2299
Epson SL/20, 60 MG	\$2249
Epson SL/25, 60 MG	\$2599
Panasonic CF370H6	
386SX-20, 60MG, VGA	\$1999

TEXAS INST.

TM 3000/40 MG	CALL
TM 3000/60 MG	CALL
TM 3000/WINSX 60	\$2029
TM 3000/WINSX 80	\$2299
TM 4000/WINSX 80	\$2569
TM 4000/WINSX 120	\$3049
TM 4000/WINDX 120	\$3549
LASER STD	\$879
LASER PS17	\$1199
LASER PS35	\$1399
LASER PS35 Turbo	\$1599
LASER 1 MG Upgrade	\$129

SOFTWARE

Adobe Type Mngr Wndws	\$59
Aldus Pagemaker	\$489
Corel Draw	\$369
Lotus 123 2.2/3.1	\$329/\$389
Microsoft Mouse	\$89
Microsoft Excel Wndws	\$299
Microsoft Windows 3.1	\$79
Microsoft DOS 5.0	\$79
PC Tools 7.1	\$79
Word Perfect 5.1	\$259
Word Perfect Windows	\$269

SCAN. & DIGIT.

Epson ES300C	\$829
Kurta XLP	\$249
Logitech ScanMan	\$135
Logitech ScanMan 256	\$259
Panasonic FXRS 3070U	\$769
Summasketch 12x12	\$289
Summasketch 12x18	\$539

MULTIFUNCTION BOARDS

AST 6 Pack w/384K	\$159
Intel Above Board+	\$239
Intel Plus 8 w/2 MG	\$349
Intel Snap-In 386	\$339
Irma Board III	\$399
AST 5251-II Plus	\$459
ATI Stereo/w Speaker	\$99
Sound Blaster PROF	\$189

DRIVES & TAPES

Ext. 1.2 for PSII	\$159
Toshiba 3 1/2" 720K	\$69
Toshiba 3 1/2" 1.44	\$69
Colorado Jumbo 120	\$199
Colorado Jumbo 250	\$249

AMERICAN UPS

250	\$119	600	\$269
400	\$165	800	\$559
450	\$199	1200VX	\$729

CD ROM OPTICAL DISKS

NEC CDR-74	\$629
NEC CDR-84	\$569
Panasonic LK-MC 501B	\$369
Panasonic LK-MC 501S	\$539

SEAGATE HARD DISKS

40 MB for AT (ST251-1)	\$239
80 MB for AT (4096)	\$399
80 MG 296 Kit	\$299
89 MG 3096	\$279
106 MG 3120A	\$329
120 MG 3144A	\$359
211 MG 1239	\$569

IOMEGA

90 MB Int. w/boot card	\$779
90 MB Ext. w/boot card	\$799

PLUS HARD CARD

40 MB/50 XL	\$549/\$239
80 MB/105 MB	\$379/\$389

CONNOR HARD DRIVES

40 MB	\$199
120 MB	\$329
200 MB	\$549

MODEMS

Hayes Pocket 2400	\$119
Hayes 2400 Optima	\$149
Hayes Optima 96	\$339
Hayes Ultra 96	\$549
Hayes Ultra 96 14.4	\$629
Intel 2400 Ext. V.42	\$149
Practical Per. 2400 Int.	\$79
Practical Per. 2400 Ext.	\$119
Practical Per. 9600	\$265
Practical Per. 14.4 Int.	\$329
Practical Per. 14.4	\$359
TI 2400 Fax/Modem	\$279
US Robotics 9600	\$539
US Robotics Dual Std	\$749
US Sportster 14.4 Ext.	\$339
US Sportster 14.4 Fax	\$359

intel

SatisFAXtion MODEMS

100 2400/9600 Fax	\$99
200 2400 V.42/9600 Fax	\$275
400 14.4/14.4 Fax	\$375
400 Ext 14.4/14.4 Fax	\$419

CHIPS

256K/1 MG Chips, each	\$3/\$6
256K/1MB Simms	\$15/\$39
4MB Simms	\$139
Compaq 386 4 MB	\$219
Compaq LTE 386 4MB	\$239
HP 2MG Upgrade	\$119
IBM 70 & 80 2 MB	\$109
IBM 70 & 80 4 MB	\$219
OKI Laser 2MB	\$149
Toshiba 3100SX 4MB	\$229
Toshiba 3200SX 4MB	\$229
TI Notebook 2 MG	\$139

intel

Intel 8087-2	\$109
80287-10XL/XLT	\$79
80387 SX-16/20/25	\$75
80387-16/20/25/33	\$85
80487 SX	\$439
RapidCAD	\$249
Overdrive SX20/25	\$429/\$535

NETWORKING

Netware 2.2 5 User	\$499
Netware 2.2 10 User	\$1099
Netware 2.2 50 User	\$1999
Netware 3.11 5 User	\$599
Netware 3.11 10 User	\$1499
Lantastic 10BPS Starter	\$459
E143 Ethernet	\$199
NE1000 Ethernet	\$129
NE2000	\$149
Ethercard +/-16	\$119/\$139
EtherLink II 3 Com	\$185
Intel Ether 16	\$119

VIDEO BOARDS

ATI VGA Wonder XL	\$139
ATI VGA Wonder 1MG	\$149
ATI 8514 1MG	\$379
ATI Graph Ultra 1MG	\$389
Boca Super VGA	\$99
1024 VGA 16 Bit	\$79
Orchid Pro IIS 1MG	\$179
Orchid Fahrenheit 1MG	\$269
Paradise VGA 1024	\$139

MONITORS

mitsubishi

EGA	\$239
Diamond Scan 4533C	\$449
HL6605 16"	\$949
HL6945 20"	\$1779
Monitor Stand	\$29

NEC

3 FGX/4 FG	\$639/\$759
5 FG	\$1329
6 FG	\$2399
Multisync VD	\$1599

PANASONIC

1381 VGA 1024x768	\$319
1395 VGA 1024x768	\$429
1991 VGA 1280x1024	\$1539

GOLDSTAR

1453 VGA 1024 x 768	\$259
1460 VGA 1024 x 768	\$299
1620+ VGA	\$689

CIRCLE 336 ON READER SERVICE CARD

**Arlington
Computer
Products, inc.**

Prices and availability subject to change
without notice. Purchase orders accepted
from Qualified Customers.

HOURS C.S.T.
7:30 - 6:30 pm - Mon-Fri
9:00 - 1:00 pm - Saturday
1970 CARBOY
MT. PROSPECT, IL 60056

FOR ORDER & SERVICE

800-548-5105

CUSTOMER SERVICE AND IN ILLINOIS 708-228-6333

SHIPPING 708-228-9748

TECHNICAL ASSISTANCE 708-228-1470

We Export! FAX 708-228-0516

SPREADSHEETS

A Directory Menu for 1-2-3: Two macros that take you to the directory of your choice

BY CRAIG STINSON

A Directory Menu for 1-2-3

To simplify the start of every Lotus 1-2-3, Release 2.2, session, I wrote the short auto-executing macro listed in Figure 1. This macro, stored in an AUTO123.WK1 file, immediately displays a menu of my data directories and allows me to choose the directory I want to work in. The menu is shown to the right, with two columns of sample directory names—one for my C: drive and one for my D: drive.

The {?} command puts the macro in "pause" mode while it displays the directory menu. All I have to do then is put the cursor on the name of the directory I want and press Enter. The macro re-

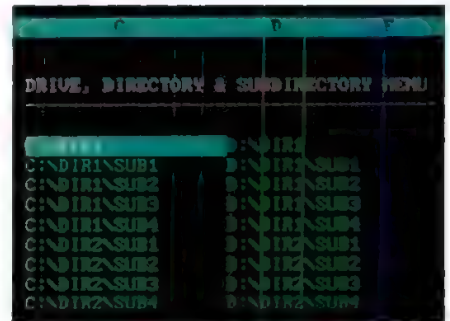
sumes by issuing a /File Directory command to make the selected directory the default. Then it presents a list of the worksheet files contained in the selected directory, allowing me to point to the one I want to use.

As I create new directories and clean out old ones, I just update the menu.

John Burnett

Ville de la Baie, Quebec
Canada

► **PC MAGAZINE** Mr. Burnett's simple macro looks as if it may save a lot of time and keystrokes for users who regularly work in many different directories. It also may prove useful to those who supervise relatively inexperienced 1-2-3 users, par-



DRIVE, DIRECTORY & SUBDIRECTORY MENU	
C:\DIR1\SUB1	D:\DIR1\SUB1
C:\DIR1\SUB2	D:\DIR1\SUB2
C:\DIR1\SUB3	D:\DIR1\SUB3
C:\DIR1\SUB4	D:\DIR1\SUB4
C:\DIR2\SUB1	D:\DIR2\SUB1
C:\DIR2\SUB2	D:\DIR2\SUB2
C:\DIR2\SUB3	D:\DIR2\SUB3
C:\DIR2\SUB4	D:\DIR2\SUB4

The macros in Figures 1 and 2 refer to this list of directories.

ticularly users who aren't comfortable navigating DOS directory trees.

As usual with macros presented here, define the names in the first column for the cells to their right.

If you're planning to give this macro to other users, you might want to embellish it slightly, as shown in Figure 2. This version includes an onerror statement to guard against the possibility that the user will happen to select an invalid directory name. (Ideally, of course, you'll keep the menu up to date so that this can't happen.) The version in Figure 2 also prevents the user from dropping out of the macro with Ctrl-Break. If either of these events occurs, the modified macro beeps, displays a message, and invites the user to try again. □

START.WK1

Complete Listing

```

1      J      K
2      \0      {PANELOFF}{HOME}~{GOTO}C6~
3              {?}/C~FNAME~
4              /FD
5      FNAME
6              ~
7              {PANELON}
8              /FR{NAME}

```

Figure 1: This short 1-2-3 macro works with a list like the one in the screen above to give you a choice of directories. To do this at start-up, it must be named AUTO123.WK1 and placed in the default directory.

START2.WK1

Complete Listing

```

1      J      K
2      \0      {onerror tryagain}
3              {PANELOFF}{HOME}{GOTO}C6~
4              {?}/C~FNAME~
5              /FD
6      FNAME
7              ~
8              {PANELON}
9              /FR{NAME}
10     TRYAGAIN {beep}{Indicate MESSAGE}
11             {wait @now+@time(0,0,3)}{indicate}
12             {branch \0}
13
14     MESSAGE Please select a directory and press Enter!

```

Figure 2: A more sophisticated version of the macro in Figure 1.

HINTS, TIPS, QUESTIONS

Share your latest spreadsheet discovery through *PC Magazine's* Spreadsheets. We'll pay you \$50 for any tip we print. Please submit your letter on-disk, together with a print-out. Mail your contribution to Spreadsheets, *PC Magazine*, One Park Ave., New York, NY 10016, or upload it to PC MagNet.

USA FLEX... FOR SOLUTIONS THAT

Flex Advantages

- ✓ 15 Years of the Service and Support You Expect
- ✓ 30 Day "No-Risk" Money Back Guarantee
- ✓ Toll-Free Technical Support
- ✓ Free On-Site Service for 1st Year
- ✓ Full One Year Warranty... Parts and Labor Included
- ✓ Total Solutions
- ✓ Friendly, Knowledgeable Sales Staff
- ✓ Over 250,000 Satisfied Customers
- ✓ Quick Delivery
- ✓ Variety of Payment Options



FLEX 386SXL 33MHz

- Am386SXL™ 33MHz Processor
- 105 MB < 16ms Hard Disk Drive
- 2 MB RAM Expandable to 16 MB
- Super VGA 1024 X 768 "FLEXVISION" 14" .28 mm Monitor
- Super VGA Card with 1 MB Memory for 1024 x 768
- 1.2 MB & 1.44 MB Floppy Disk Drives
- 101 Key Keyboard
- 2 Serial and 1 Parallel Port
- Highest Quality Premium Cabinet

Plus... Dos 5.0, Windows 3.1 and Mouse!

\$1199

Lease from
\$53 /Month*

FLEX 386DXL 40MHz

- Am386DXL™ 40MHz Processor
- 64K Ultra-fast "Writeback" Cache
- 105 MB < 16ms Hard Disk Drive
- 4 MB RAM Expandable to 32 MB
- Super VGA 1024 X 768 "FLEXVISION" 14" .28 mm Non-Interlaced Monitor
- Super VGA Card with 1 MB Memory for 1024 x 768
- 1.2 MB & 1.44 MB Floppy Disk Drives
- 101 Key Keyboard
- 2 Serial and 1 Parallel Port
- Highest Quality Premium Cabinet

Plus... Dos 5.0, Windows 3.1 and Mouse!

\$1399

Lease from
\$62 /Month*

FLEXNOTE 386SXL 25MHz

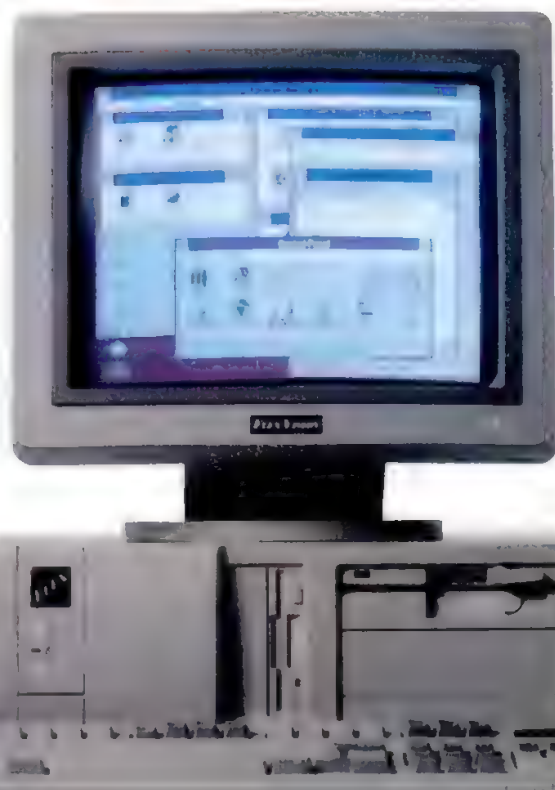
- 80 MB Hard Drive
- 2 MB RAM
- 5.7 lbs.
- 3.5" 1.44 MB Floppy Drive
- 1 Parallel, 1 Serial & 1 Mouse Port
- Super Fast VGA Graphics
- Full Size 85 Key Keyboard
- Pre-loaded Microsoft DOS 5.0, & Microsoft Windows 3.1

\$1695

2 YEAR WARRANTY



- FREE** Carrying Case
- FREE** Pen Mouse
- FREE** 30 Day "NO RISK" Money Back Guarantee
- FREE** 24 Hour Toll Free Technical Support **7 DAYS A WEEK!**
- FREE** 2 Year Warranty



ARE MORE THAN JUST SYSTEMS!

FLEX 486SX 25MHz

- 80486SX 25MHz Microprocessor
 - 64K Ultra-fast "Writeback" Cache
 - 105 MB < 16ms Hard Disk Drive
 - 4 MB RAM Expandable to 32 MB
 - Super VGA 1024 X 768 "FLEXVISION" 14" .28 mm Non-Interlaced Monitor
 - Super VGA Card with 1 MB Memory for 1024 x 768
 - 1.2 MB & 1.44 MB Floppy Disk Drives
 - 101 Key Keyboard
 - 2 Serial and 1 Parallel Port
 - Highest Quality Premium Cabinet
- Plus... Dos 5.0, Windows 3.1 and Mouse!

\$1449 Lease from \$63 /Month*

FLEX 486DX 33MHz

- 80486 33MHz Microprocessor
 - 64K Ultra-fast "Writeback" Cache
 - 105 MB < 16ms Hard Disk Drive
 - 4 MB RAM Expandable to 32 MB
 - Super VGA 1024 X 768 "FLEXVISION" 14" .28 mm Non-Interlaced Monitor
 - Super VGA Card with 1 MB Memory for 1024 x 768
 - 1.2 MB & 1.44 MB Floppy Disk Drives
 - 101 Key Keyboard
 - 2 Serial and 1 Parallel Port
 - Highest Quality Premium Cabinet
- Plus... Dos 5.0, Windows 3.1 and Mouse!

\$1699 Lease from \$64 /Month*

FLEX 486DX 33MHz with 210 MB Hard Drive \$1899

FLEX 486DX2 50MHz

- 80486DX2 50MHz Microprocessor
 - 64K Ultra-fast "Writeback" Cache
 - 210 MB < 16ms Hard Disk Drive
 - 4 MB RAM Expandable to 32 MB
 - Super VGA 1024 X 768 "FLEXVISION" 14" .28 mm Non-Interlaced Monitor
 - Super VGA Card with 1 MB Memory for 1024 x 768
 - 1.2 MB & 1.44 MB Floppy Disk Drives
 - 101 Key Keyboard
 - 2 Serial and 1 Parallel Port
 - Highest Quality Premium Cabinet
- Plus... Dos 5.0, Windows 3.1 and Mouse!

\$2099 Lease from \$78 /Month*

FLEX 486DX 33MHz Local Bus

- 80486DX 33MHz Microprocessor
 - 64K Ultra-fast "Writeback" Cache Mem.
 - 170 MB < 16ms Hard Disk Drive
 - 4 MB RAM Expandable to 32 MB
 - Super VGA 1024 X 768 "FLEXVISION" 14" .28 mm Non-Interlaced Monitor
 - 32 Bit Local Bus Windows Accelerator Video Card
 - 1.2 MB & 1.44 MB Floppy Disk Drives
 - 101 Key Keyboard
 - 2 Serial and 1 Parallel Port
 - Highest Quality Premium Cabinet
- Plus... Dos 5.0, Windows 3.1 and Mouse!

\$1879 Lease from \$70 /Month*

ALL SYSTEMS INCLUDE:

Pre-loaded Microsoft DOS 5.0, & Microsoft Windows 3.1

- FREE** One Year Parts and Labor Warranty
- FREE** 24 Hour Toll-Free Technical Support, **7 DAYS A WEEK!**
- FREE** Over-Night Parts Replacement via Federal Express
- FREE** On-Site Service Should An Unusual Problem Occur
- FREE** McAfee Antivirus Software
- FREE** 30 Day "NO RISK" Money Back Guarantee

FCC Class B Approved
U/L and CSA Approved

ORDER YOUR FLEX SYSTEM READY TO GO!

Choose the software you need and we'll download it **FREE!**



- Quattro Pro 4.0 for Windows \$299
- Microsoft Excel for Windows V4.0 \$299
- Lotus 1-2-3 for Windows V1.1 \$379
- Microsoft Word for Windows \$299
- WordPerfect for Windows V5.1 \$259
- Microsoft Works for Windows V2.0 \$129
- PFS: WindowWorks \$109
- Lotus Freelance Graphics V4.0 \$299
- dBASE IV V1.5 \$459

USA FLEX

TO ORDER:

800-800-4395

FAX # (708) 351-7204

Government & Education Sales 1-800-767-0153

Habla Espanol 1-800-872-4691

The Intel Logo is a registered trademark of Intel Corporation. All products or services are identified by the trademarks or service marks of their respective companies. Specific software documentation may differ from that illustrated. All prices and specifications are subject to change without notice. Shipping and handling charges additional. 30 day money back guarantee applies to Flex systems only. Downloaded and opened software is not refundable. * Monthly payment based on 36 month open and lease.

Code # PM09B2

Special Money Saving Rates on
FEDEX® Economy Two-Day™
Delivery Service*



Ask your sales
representative for details.



CIRCLE 189 ON READER SERVICE CARD



USA FLEX... FOR SOLUTIONS THAT

MONITOR BUNDLE SPECIAL



MAG
INNOVISION

15" MAG Monitor and ATI
Video Card Bundle

\$999 MAG-MX15F-U

MAG InnoVision's 15" MX15F
Multi-frequency Color Monitor

- 1280 x 1024 Non-interlaced
- Flat Square Tube with INVAR shadow mask and non-glare etched screen
- .28mm Dot Pitch
- ATI Graphics ULTRA
- 1 MB VRAM • OEM box and manual



MONITORS

Panasonic
Once Automatic



14" C1381I, .28mm, 1024 x 768 Int. **\$324**
14" C1395, .28mm, 1024 x 768 NI **\$449**

SAMSUNG

12" Amber Mono, 720 X 350 **\$69**
14" ML4571, White VGA, 640 x 480 **\$119**
14" CVL4955, .41mm, 640 X 480 **\$219**
14" SM 2, .39mm, 1024 X 768 Int. **\$249**
14" SM 3, .28mm, 1024 X 768 Int. **\$299**
14" SM 3n, .28mm, 1024 X 768 NI **\$369**
15" SM 15, .28mm, 1024 X 768 NI **\$499**
17" SM 4, .31mm, 1024 X 768 NI **\$799**

NEC

14" 2A, .31mm, 800 X 600 **\$399**
15" 3FGx+, .28mm, 1024 X 768 NI **\$639**
15" 4FGx+, .28mm, 1024 X 768 NI **\$749**
17" 5FGx+, .28mm, 1280 x 1024 NI **\$1349**
21" 6FGx+, .28mm, 1280 x 1024 NI **\$2799**
*with AccuColor Control, 1-Special on 15" monitor lens,
2-Free 17" monitor lens w/5FG purchase, ask for details.

CTX

14" 5468, .28mm, 1024 X 768 Int. **\$329**
14" 5468NI, .28mm, 1024 X 768 NI **\$369**
17" 1760 Proscan, .28mm, 1280 x 1024 NI **\$829**

MAG

15" MX15F Microprocessor based,
.28mm, 1280 X 1024 NI **\$579**
17" MX17F Microprocessor based
.26mm, 1280 X 1024 NI **\$1099**

SONY

14" CPD-1320 - .25mm, 640 X 480 **\$349**
14" CPD-1304 - .25mm, 1024 x 768 NI **\$639**
17" CPD-1604S - .25mm, 1024 x 768 NI **\$1049**

REFURBISHED MONITORS

All Monitors include a 30 day warranty!

NEC

14" GS2A D1-NECGS2AR **\$99**
1 year warranty for GS2A 99-CWU15 **\$15**
14" 2A D1-NEC2AR **\$299**
14" 3D D1-NEC3DR **\$399**
16" 4D D1-NEC4DR **\$649**
*1 year warranty 2A/Plus/3D/4D 99-CW30 **\$30**
20" MS 5D D1-NEC5DR **\$1499**
*1 year warranty for 5D 99-CWU50 **\$50**

SONY

14" CPD-1302 D1-S1302-R Limited Quantity **\$449**
14" CPD-1304 D1-S1304-R **\$499**
*1 year warranty for 1302/1304 **\$30**

SAMSUNG

12" Amber flat BW-MA2565 **\$49**
14" White flat BW-MZ4571 **\$59**

TOSHIBA LAPTOPS

T2200SX - Intel80386™SX
20MHz w/80MB HD & 2MB RAM
PC22-PA1025U **\$2299**
T3300 SL - Intel386™SL 25MHz, 64K Cache &
2MB RAM
80MB HD PC23-PA1066U **\$2549**
120MB HD PC23-PA1067U **\$2799**
T4400SX - Intel486™SX 25MHz w/80MB HD,
8K Cache, 2MB RAM
LCD Display PC24-PA1102U **\$2979**
Gas Plasma Display PC24-PA1102UW **\$3249**
Color Display PC24-PA1102UX **\$4789**
T4400SX - Intel486™SX 25MHz w/120MB HD,
8K Cache, 2MB RAM
LCD Display PC24-PA1103U **\$3249**
Gas Plasma Display PC24-PA1103UW **\$3489**
Color Display PC24-PA1103UX **\$4999**
T6400 SX - Intel486™SX 25MHz w/120MB HD,
8K Cache, 4MB RAM
Gas Plasma Display PC25-PA1560U **\$4259**
Color Display PC25-PA1560UX **\$5599**
T6400 DX - Intel486™SX 33MHz w/200MB HD,
8K Cache, 4MB RAM
Gas Plasma Display PC25-PA1601U **\$5199**
Color Display PC25-PA1601UX **\$7599**

VIDEO & SOUND CARDS

STB WIND/X Windows
Accelerator Board 1MB
STB Systems, Inc D1-S3VGA **\$289**

DIAMOND SpeedSTAR24X - 1MB VGA
Computer Systems, Inc. D1-DSS/1MB/24X **\$185**
Stealth 24 - 1MBVGA D1-DST/1MB **\$249**
SpeedSTAR24 - 1MB VGA D1-DSS/1MB/24.. **\$159**

ORCHID ProDesigner II/s - 1MB
D1-ORCH/PRO **\$189**
Farenheit 1280 - 1MB
D1-C1395 **\$299**

ATI VGA WONDER XL24™ - 1MB
D1-ATI/WDR24 **\$189**
ATI GRAPHICS ULTRA™ - 1MB
D1-ATI/G/ULT **\$429**

Sound Blaster PRO D1-BLASTERP **\$185**
Sound Blaster 1.5 D1-BLASTER **\$114**

MODEMS

Int. 2400 Baud w/Bitcom MNP D1-FTM-C **\$89**
Ext. 2400 Baud D1-24DTM-C **\$89**
Int. 2400 Baud V.42 bis, MNP D1-48FTM **\$89**
Ext. 2400 Baud V.42 bis, MNP D1-48DTM **\$119**
Int. 9600 Baud V.42 bis, MNP D1-96FTM **\$279**
Ext. 9600 Baud V.42, MNP D1-96DTM **\$329**
Int. 9600 Baud V.32, MNP D1-9650V32 **\$279**
Int. 24/96 Send/Receive Fax Modem
w/Flashfax D1-WIN24SR **\$109**
Int. 24/96 Send/Receive Fax Modem
w/V.42 bis, MNP D1-C2496-42 **\$139**
Int. 2400 Baud Modem 9600 Send/
Receive Fax D1-MB2296SR **\$99**
Ext. 14,400 V.32 bis Fax/Modem
w/Turbo Fax V.42 bis, MNP D1-C14.4E **\$349**

PRACTICAL PERIPHERALS

2400 Baud
INT. D1-PM2400 *79 EXT. D1-PM2400SA *99
2400 Baud V.42 bis
INT. D1-PM2400V42 *109 EXT. D1-PM24SAV42 *129
2400/9600 Send/rec. Fax
INT. D1-PM24FX96 *89 EXT. D1-PM24FX96SA *99
9600 Baud V.32/V.42 bis
INT. D1-PM9600 *289 EXT. D1-PM9600SA *299
14,400 modem/9600 fax V.32 bis
INT. D1-PM14FX *359 EXT. D1-PM14FXSA *389

PRINTERS

**IDM LASER PRINTERS
BY LEXMARK™**

LaserPrinter E - 5 ppm, 10 fonts, 512K, 300 dpi
4019E01 **NEW LOW PRICE \$749**
LaserPrinter - 10 ppm, 10 fonts, 512K, 300 dpi
4019001 **\$1399**
LaserPrinter SE - 5 ppm, 26 fonts, 1MB, 300 dpi
4029010 **\$999**
LaserPrinter 6 - 6 ppm, 27 fonts, 1MB, 300 dpi*
4029020 **\$1299**
LaserPrinter 10 - 10 ppm, 27 fonts, 1MB, 300
dpi* 4029030 **\$1549**
LaserPrinter 10L - 10 ppm, 27 fonts, 1MB, 300
dpi* 4029040 **\$1999**

*Exp. up to 600 dpi with the addition of 5MB + PostScript.

IDM DOT MATRIX PRINTERS BY LEXMARK™

Model 2380 - N-carr., 240 X 144 dpi, 320 cps,
65-NLQ, 4 fonts 2380001 **\$329**
Model 2381 - W-carr., 240 X 144 dpi, 320 cps,
65-NLQ, 4 fonts 2381001 **\$459**
Model 2390 - N-carr., 360 dpi, 200 cps, 60-LQ,
8 fonts 2390001 **\$329**
Model 2391 - W-carr., 360 dpi, 200 cps, 60-LQ,
8 fonts 2391001 **\$459**

IDM PORTABLE PRINTERS BY LEXMARK™

2.5 lbs. with battery, 360 dpi, battery operated,
53 LQ, 1 year Lexmark™ Express Service
Black 5183010 or White 5183020 **\$349**

EPSON LASER PRINTERS

ACTION LASER II -
6 ppm, 14 fonts, 300 dpi, 512K **\$699**
EPL-8000 -
10 ppm, 14 fonts, 300 dpi, 1MB **\$1299**
EPL-7500 PS -
6 ppm, 35 fonts, 300 dpi, 512K **\$1299**

EPSON DOT MATRIX PRINTERS

LX-810 N-carr., 240 X 216 dpi, 3 fonts **\$175**
AP 3250 N-carr., 360 dpi, 6 fonts **\$219**
FX-850 N-carr., 240 X 216 dpi, 3 fonts **\$294**
FX-1050 W-carr., 240 X 216 dpi, 3 fonts **\$389**
LQ-570 N-carr., 360 dpi, 12 fonts **\$264**
LQ-1070 W-carr., 360 dpi, 12 fonts **\$379**
LQ-870 N-carr., 360 dpi, 12 fonts **\$439**
LQ-860 Color N-carr., 360 dpi, 4 fonts **\$554**
LQ-1170 W-carr., 360 dpi, 12 fonts **\$594**
LQ-2550 Color W-carr., 360 dpi, 8 fonts .. **\$674**
DFX-5000 W-carr., 240 X 216 dpi,
533* cps, 80-NLQ, 3 fonts **\$1,279**
DFX-5000 same as DFX-5000 with
1066* cps and 192-NLQ **\$2,154**

*Super draft mode

MATH COPROCESSORS

intel INTEGRATED INFORMATION

	INTEL	ITT
80287-8, 8-10 MHz	\$99	\$59
80287-10, 10 MHz+	\$99	\$69
80387-SX, 16 MHz	\$95	\$79
80387-SX20, 20 MHz	\$95	\$79
80387-SX25, 25 MHz	\$95	\$79
80387-SX33, 33 MHz	\$95	\$79
80387-16, 16 MHz	\$99	\$89
80387-20, 20 MHz	\$99	\$89
80387-25, 25 MHz	\$99	\$89
80387-33, 33 MHz	\$99	\$89
80387-40, 40 MHz	N/A	\$119

MODEMS

TWINCOM™

2400/9600 Send/rec. Fax
INT. D1-TCOM24/96 **\$109**
EXT. D1-TC24/96E **\$119**
EXT. 14,400 fax V.42 bis D1-TC14.4 **\$299**

ARE MORE THAN JUST SYSTEMS!

NEC LASER PRINTERS

Silentwriter Model 95 -

PostScript printer, 6 ppm, 35 scalable Adobe fonts, 14 bitmap fonts, 8 scalable HP fonts, 300 dpi, 2MB and built in env. feeder ***1399**

NEC LASER PRINTERS

Silentwriter Model 950 -

PostScript printer, RISC processor, up to 8 ppm, 35 scalable Adobe fonts, 14 bitmap fonts, 300 dpi, 2MB and 200 sht. letter cass ***1479**

NEC DOT MATRIX PRINTERS

24-Pin Pinwriter® Printers with 360 DPI

P3200 N-carr., 8K, up to 216 CPS ***229**
P3300 W-carr., 8K, up to 216 CPS ***329**
P6200 N-carr., 80K, up to 300 CPS ***409**
P6300 W-carr., 80K, up to 300 CPS ***629**
P9300 W-carr., 80K, up to 400 CPS ***829**

CANON BUBBLE JET PORTABLE PRINTERS

BJ-10ex 360 dpi, 37K, 6 fonts, 142 cps .. ***299**
BJ-300 N-carr., 360 dpi, 30Kb, 3 fonts, 600 cps ***439**
BJ-330 W-carr., 360 dpi, 30Kb, 3 fonts, 600 cps ***589**



DOT MATRIX PRINTERS

NX-1001 Multi-font - 9 pin, 5 resident fonts, up to 180cps in draft ***139**
NX-2420 Rainbow - 7 color printing, 24 pin, 7 fonts, up to 250 cps in draft ***299**

Panasonic LASER PRINTERS

KX-P4410 - 5 ppm, 28 fonts, 300 dpi, 512K ***629**
KX-P4430 - 5 ppm, 28 fonts, 300 dpi, 1MB ***889**
KX-P4450I - 11 ppm, 28 fonts, 300 dpi, 512K ***1079**
KX-P4455 PS - 11 ppm, 39 fonts, 300 dpi, 512K ***1699**

*Exp. up to 600 dpi with the addition of 5MB + PostScript.

Panasonic DOT MATRIX PRINTERS

KX-P1180I N-carr., 240 x 216 dpi, 6 fonts ***148**
KX-P2180 N-carr., 240 X 216 dpi, 9 fonts ***179**
KX-P1123 N-carr., 360 dpi, 7 fonts ***199**
KX-P2123 N-carr., 360 dpi, 10 fonts ***249**
KX-P1124I N-carr., 360 dpi, 10 fonts ***274**
KX-P2124 N-carr., 360 dpi, 12 fonts ***324**
KX-P1624 W-carr., 360 dpi, 7 fonts ***329**
KX-P1695 W-carr., 240 X 216 dpi, 8 fonts ***368**
KX-P1654 W-carr., 360 dpi, 10 fonts ***539**
KX-P2624 W-carr., 360 dpi, 11 fonts ***399**



CD ROM DRIVES

SONY INTERNAL & EXTERNAL CD ROM

MPC standards, 340ms, dust proof construction, built-in audio, layered error correction code, includes genuine Sony interface card
Int. D1-535-K *345 Ext. D1-7205N-K *459

MAGNAVOX EXTERNAL CD ROM

Combo external CD ROM & CD audio player
 Stereo audio cable, MS DOS extensions/driver software, power cord, interface card & cable, CD audio playback with front panel controls, <700ms access time. **D1-CD0461BK *299**

MAGNAVOX INTERNAL CD ROM

Meets MPC standard, no caddy needed, <375 ms access time, CD audio playback with front panel, includes AT interface, made in the U.S.A.
D1-CM205XBK *319

NEC INTERNAL & EXTERNAL CD ROM

280ms access time, 300KB/second data transfer rate, double dust doors, MPC compliant, 2 year warranty, 64K cache, AT interface card
Int. D1-CDR-84 *599 Ext. D1-CDR-74 *659

CD ROM SOFTWARE TITLES Buy any Sony, NEC or Magnavox CD ROM drive listed above and receive any of these CD titles at Flex's special package price. If you already own a CD ROM drive you may purchase these titles at Flex's low discount prices.

SOFTWARE TITLES Package \$/Discount \$

Time Table of History: Sci. & Inn. ***20/*55**
 U.S. & World Atlas (MPC) ***25/*79**
 Mavis Beacon Teaches Typing (MPC) ... ***29/*49**
 Time Compact Almanac ***29/*109**
 Interactive Storytime ***29/*49**
 Bible Library ***29/*149**
 Reference Library (Bookshelf) ***30/*65**
 Electronic Home Library ***35/*69**
 US History ***35/*229**
 Great Cities of the World ***35/*49**
 US Atlas with Automap ***35/*89**
 Toolworks Illustrated Enc (MPC) ***49/*239**
 CD Game Pack II (10 Exciting Games) .. ***25/*49**
 ChessMaster 3000 (MPC) ***29/*49**
 Loom (Lucas Film) ***29/*49**
 Secret of Monkey Island (Lucas Film) .. ***29/*49**
 Secret weapons of the Luftwaffe (Lucas Film) ***29/*49**
 Wing Commander/SM 1 & 2 ***35/*65**
 Wing Commander/Ultima VI ***35/*65**
 Sherlock Holmes ***29/*49**

DRIVES

Seagate HARD DRIVES

ST351A/X 42.8MB, IDE ***199**
ST3120A 106.9MB, 15ms, IDE ***299**
ST3144A 130MB, 16ms, IDE ***339**
ST3283A 245MB, 12ms, IDE ***639**
ST3283N 248MB, 12ms, SCSI ***659**
ST1480A 426MB, 14ms, IDE ***1149**
 IDE Floppy Controller ***39**
 SCSI/Floppy Controller ***99**
 Cable and frame kit sold separately. Ask for pricing.

MicroSolutions

BACKPACK EXTERNAL DRIVES

Plug 'N Play - No Slot Drives

Floppy Drive 3.5" 1.44 MB D1-BP1.44 ***199**
Floppy Drive 5.25" 1.2 MB D1-BP1.2 ***199**
 Floppy Drives require DOS 2.0 or above
Tape Drive
80/250 MB w/Data Comp. D1-BP80/TD ***439**
Hard Drive 40 MB D1-BP40HD ***439**
Hard Drive 100 MB D1-BP100/HD ***519**
 Tape and Hard Drives require DOS 3.0 or above

TAPE BACK UP

COLORADO MEMORY SYSTEMS INC.

JUMBO 120 - 120MB storage capacity
 INT. SYSTEM **D1-JUMBO** ***189**
 EXT. SYSTEM **D1-JUMBO & D1-KE-10*** ***285**
JUMBO 250 - 250MB storage capacity
 INT. SYSTEM **D1-DJ-20** ***247**
 EXT.L SYSTEM **D1-DJ-20 & D1-KE-10*** ***347**
QFA 700 - 700MB storage capacity
 INT. SYSTEM **D1-QFA-700** ***699**
 EXT. SYSTEM **D1-QFA-700E** ***899**
 QFA-700 Model Requires adapter board
D1-TC-02 ***249**
 MicroChannel™ adapter board **D1-TC-02M** ... ***299**

DATA CARTRIDGES

3M DATA CARTRIDGES Sold in fives
DC2000, 40/80 MB ***16.99ea.**
DC2000 Formatted ***18.99ea.**
DC2080, 80/160 MB ***21.99ea.**
DC2080, Formatted ***24.99ea.**
DC2060, 60 MB Formatted ***25.99ea.**
DC2120, 120/250 MB ***23.99ea.**
DC2120 Formatted ***26.99ea.**
DC600A ***20.49ea.**
DC6150, 250/500 MB ***21.49ea.**
DC300XLP ***18.69ea.**
DC6250, 250/500 MB ***25.49ea.**
DC6525, 350/700 MB ***32.99ea.**

HP FAX MACHINES & ACCESSORIES

HP FAX-200 Plain-paper, cut sheet printing, 12 page memory, ***959**
HP FAX-310 Plain-paper, cut sheet printing, 28 page memory upgradeable to 120 pages ***1279**



Black Toner Cartridge
 LaserJet II, IID, III IID 92295A ***79**
 LaserJet IIP & IIIP 92275A ***61**
 LaserJet 92285A ***82**
 LaserJet IIISI 92291A ***119**

Miscellaneous

IIP/IIIP Lower Cassette (250 Shts) ***139.00**
DeskJet Ink Cartridge ***16.95**
NEW DeskJet High Capacity Ink Cart ***27.95**
NEW DeskJet Color Cartridge ***29.95**

Paper Trays
 Letter (250 Sheets) ***52**
 Legal (250 Sheets) ***60**
 Envelope (15 env.) ***70**

*Requires Lower Cassette.

Minimum Order \$60. MasterCard, Visa, Discover and Flex Cards accepted for sales in continental USA, Alaska, Hawaii, Canada, APO, FPO and Puerto Rico. (A \$10.00 surcharge on credit card order for APO, FPO and Puerto Rico). Leasing available for qualified businesses. Shipping and handling additional. Corporations rated 1A1 or better and government accepted for Net 30 basis with receipt of a purchase order. C.O.D. order (under \$500.00 add \$5.00, over \$500.00 add \$10.00 check warranty charge. Call for special UPS and FedEx rates. Call for PAL rates. All returns must have prior authorization from our Customer Service Department. (708) 351-7372. All returns must be in original packaging and include all warranty cards and manuals. Incomplete product, returns, unauthorized returns and refused shipments are subject to a 20% restocking charge. All prices and specifications are subject to change without notice. \$10.00 minimum shipping and handling. IBM is a registered trademark of International Business Machines Corporation and used under license. Lexmark is a trademark of Lexmark International, Inc. Please refer to code numbers when placing an order.

USA FLEX • 471 Brighton Drive, Bloomington, IL 61018

CIRCLE 183 ON READER SERVICE CARD



USA FLEX

TO ORDER **1-800-800-4395**

FAX # (708) 351-7204

Government & Education Sales 1-800-767-0153

Habla Espanol 1-800-872-4691

Code # PM09B2



H. Co. has America's largest selection of **memory!**

And, we'll **beat** any USA advertised price.*



Memory is Cheap-but Only if you Know Where to Look. The Phantom Saves a Bundle on SIMMS. Truth in advertising-what a concept...

Laptop Memory

NFC	Memory Added	Price	TOYAMA	Memory Added	Price
1MB MC	\$229.00		T1000SE/KEALE	2MB	\$199.00
4MB MC	599.00		2MB		
4MB MC	599.00		4MB		
4MB MC	599.00		8MB		
4MB MC	599.00		16MB		
4MB MC	599.00		32MB		
4MB MC	599.00		64MB		
4MB MC	599.00		128MB		
4MB MC	599.00		256MB		
4MB MC	599.00		512MB		
4MB MC	599.00		1024MB		
4MB MC	599.00		2048MB		
4MB MC	599.00		4096MB		
4MB MC	599.00		8192MB		
4MB MC	599.00		16384MB		
4MB MC	599.00		32768MB		
4MB MC	599.00		65536MB		
4MB MC	599.00		131072MB		
4MB MC	599.00		262144MB		
4MB MC	599.00		524288MB		
4MB MC	599.00		1048576MB		
4MB MC	599.00		2097152MB		
4MB MC	599.00		4194304MB		
4MB MC	599.00		8388608MB		
4MB MC	599.00		16777216MB		
4MB MC	599.00		33554432MB		
4MB MC	599.00		67108864MB		
4MB MC	599.00		134217728MB		
4MB MC	599.00		268435456MB		
4MB MC	599.00		536870912MB		
4MB MC	599.00		1073741824MB		
4MB MC	599.00		2147483648MB		
4MB MC	599.00		4294967296MB		
4MB MC	599.00		8589934592MB		
4MB MC	599.00		17179869184MB		
4MB MC	599.00		34359738368MB		
4MB MC	599.00		68719476736MB		
4MB MC	599.00		137438953472MB		
4MB MC	599.00		274877906944MB		
4MB MC	599.00		549755813888MB		
4MB MC	599.00		1099511627776MB		
4MB MC	599.00		2199023255552MB		
4MB MC	599.00		4398046511104MB		
4MB MC	599.00		8796093022208MB		
4MB MC	599.00		17592186044416MB		
4MB MC	599.00		35184372088832MB		
4MB MC	599.00		70368744177664MB		
4MB MC	599.00		140737488355328MB		
4MB MC	599.00		281474976710656MB		
4MB MC	599.00		562949953421312MB		
4MB MC	599.00		1125899906842624MB		
4MB MC	599.00		2251799813685248MB		
4MB MC	599.00		4503599627370496MB		
4MB MC	599.00		9007199254740992MB		
4MB MC	599.00		18014398509481984MB		
4MB MC	599.00		36028797018963968MB		
4MB MC	599.00		72057594037927936MB		
4MB MC	599.00		144115188075855872MB		
4MB MC	599.00		288230376151711744MB		
4MB MC	599.00		576460752303423488MB		
4MB MC	599.00		1152921504606846976MB		
4MB MC	599.00		2305843009213693952MB		
4MB MC	599.00		4611686018427387904MB		
4MB MC	599.00		9223372036854775808MB		
4MB MC	599.00		18446744073709551616MB		
4MB MC	599.00		36893488147419103232MB		
4MB MC	599.00		73786976294838206464MB		
4MB MC	599.00		147573952589676412928MB		
4MB MC	599.00		295147905179352825856MB		
4MB MC	599.00		590295810358705651712MB		
4MB MC	599.00		1180591620717411303424MB		
4MB MC	599.00		2361183241434822606848MB		
4MB MC	599.00		4722366482869645213696MB		
4MB MC	599.00		9444732965739290427392MB		
4MB MC	599.00		18889465931478580854784MB		
4MB MC	599.00		37778931862957161709568MB		
4MB MC	599.00		75557863725914323419136MB		
4MB MC	599.00		151115727451828646838272MB		
4MB MC	599.00		302231454903657293676544MB		
4MB MC	599.00		604462909807314587353088MB		
4MB MC	599.00		1208925819614629174706176MB		
4MB MC	599.00		2417851639229258349412352MB		
4MB MC	599.00		4835703278458516698824704MB		
4MB MC	599.00		9671406556917033397649408MB		
4MB MC	599.00		19342813113834066795298816MB		
4MB MC	599.00		38685626227668133590597632MB		
4MB MC	599.00		77371252455336267181195264MB		
4MB MC	599.00		154742504910672534362390528MB		
4MB MC	599.00		309485009821345068724781056MB		
4MB MC	599.00		618970019642690137449562112MB		
4MB MC	599.00		1237940039285380274899124224MB		
4MB MC	599.00		2475880078570760549798248448MB		
4MB MC	599.00		4951760157141521099596496896MB		
4MB MC	599.00		9903520314283042199193993792MB		
4MB MC	599.00		19807040628566084398387987584MB		
4MB MC	599.00		39614081257132168796775975168MB		
4MB MC	599.00		79228162514264337593551950336MB		
4MB MC	599.00		158456325028528675187103900672MB		
4MB MC	599.00		316912650057057350374207801344MB		
4MB MC	599.00		633825300114114700748415602688MB		
4MB MC	599.00		1267650600228229401496831205376MB		
4MB MC	599.00		253530120045645880299366241072MB		
4MB MC	599.00		507060240091291760598732482144MB		
4MB MC	599.00		1014120480182583521197464864288MB		
4MB MC	599.00		2028240960365167042394929728576MB		
4MB MC	599.00		4056481920730334084789859457152MB		
4MB MC	599.00		8112963841460668169579718914304MB		
4MB MC	599.00		16225927682921336339159437828608MB		
4MB MC	599.00		32451855365842672678318875657216MB		
4MB MC	599.00		64903710731685345356637751314432MB		
4MB MC	599.00		129807421463370690713275502628672MB		
4MB MC	599.00		259614842926741381426551005257344MB		
4MB MC	599.00		519229685853482762853102010514688MB		
4MB MC	599.00		103845937170696552570620402102912MB		
4MB MC	599.00		207691874341393105141240804205824MB		
4MB MC	599.00		415383748682786210282481608411648MB		
4MB MC	599.00		830767497365572420564963216823296MB		
4MB MC	599.00		1661534994731144841129926433646592MB		
4MB MC	599.00		3323069989462289682259852867293184MB		
4MB MC	599.00		6646139978924579364519705734586368MB		
4MB MC	599.00		13292279957849158729039411469172736MB		
4MB MC	599.00		26584559915698317458078822938345472MB		
4MB MC	599.00		53169119831396634916157645876690944MB		
4MB MC	599.00		106338239662793269832315291753381888MB		
4MB MC	599.00		212676479325586539664630583506767744MB		
4MB MC	599.00		425352958651173079329261167013535488MB		
4MB MC	599.00		850705917302346158658522334027070976MB		
4MB MC	599.00		1701411834604692317317104468054141952MB		
4MB MC	599.00		3402823669209384634634208936108283904MB		
4MB MC	599.00		6805647338418769269268417872216567808MB		
4MB MC	599.00		13611294676837538538536835744431135616MB		
4MB MC	599.00		27222589353675077077073671488862271232MB		
4MB MC	599.00		54445178707350154154147342977724542464MB		
4MB MC	599.00		10889035741470030830829468595544908512MB		
4MB MC	599.00		21778071482940061661658937191089817024MB		
4MB MC	599.00		43556142965880123323317874382179634048MB		
4MB MC	599.00		87112285931760246646635748764359268096MB		
4MB MC	599.00		174224571863520493293271497528718536192MB		
4MB MC	599.00		348449143727040986586542995057437072384MB		
4MB MC	599.00		696898287454081973173085990114874144768MB		
4MB MC	599.00		1393796574908163946346171880229748289536MB		
4MB MC	599.00		2787593149816327892692343760459496579072MB		
4MB MC	599.00		5575186299632655785384687520918993158144MB		
4MB MC	599.00		11150372599265311570769375041837986316288MB		
4MB MC	599.00		22300745198530623141538750083675972632576MB		
4MB MC	599.00		44601490397061246283077500167351945265152MB		
4MB MC	599.00		89202980794122492566155000334703890530304MB		
4MB MC	599.00		178405961588244985132310000669407781060608MB		
4MB MC	599.00		356811923176489970264620001338815562121216MB		
4MB MC	599.00		713623846352979940529240002677631124242432MB		
4MB MC	599.00		1427247692705959881058480005355262248444864MB		
4MB MC	599.00		2854495385411919762116960010710524496889728MB		
4MB MC	599.00		5708990770823839524233920021421048993779456MB		
4MB MC	599.00		11417981541647679048467840042842097987558912MB		
4MB MC	599.00		22835963083295358096935680085684195975117824MB		
4MB MC	599.00		45671926166590716193871360171368391950235648MB		
4MB MC	599.00		91343852333181432387742720342736783900471296MB		
4MB MC	599.00		182687704666362864775485440685473567800942592MB		
4MB MC	599.00		365375409332725729550970881370947135601885184MB		
4MB MC	599.00		730750818665451459101941762741894271203770368MB		
4MB MC	599.00		1461501637330902918203883524837888542407540736MB		
4MB MC	599.00		2923003274661805836407767049675777084815081504MB		
4MB MC	599.00		5846006549323611672815534099351554169630163008MB		
4MB MC	599.00		11692013098647223345631068198703108339260326016MB		
4MB MC	599.00		23384026197294446691262136397406216678520652032MB		
4MB MC	599.00		46768052394588893382524272794812433357041304064MB		
4MB MC	599.00		93536104789177786765048545589624866714082608128MB		
4MB MC	599.00		187072209578355573530097091179249733428164116256MB		
4MB MC	599.00		374144419156711147060194182358499466856328232512MB		
4MB MC	599.00		748288838313422294120388364716998933712656465024MB		
4MB MC	599.00		1496577676626844588240776729433997867425312930048MB		
4MB MC	599.00		2993155353253689176481553458867995734850625860096MB		
4MB MC	599.00		5986310706507378352963106917735991469701251720192MB		
4MB MC	599.00		11972621413014756705926213835471982939402503440384MB		
4MB MC	599.00		23945242826029513411852427670943965878805006880768MB		
4MB MC	599.00		478904856		

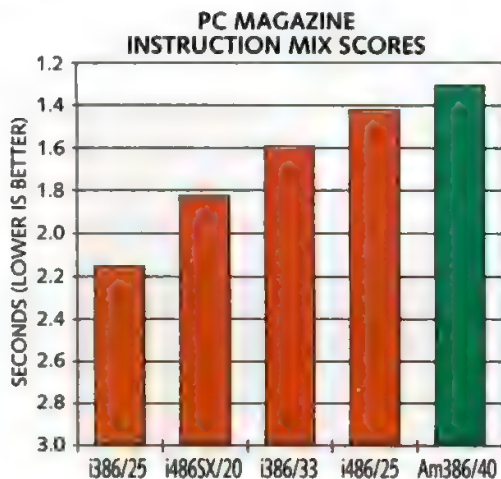
FASTMICRO REVEALS THE SECRET BEHIND THE FASTEST 386 EVER!



IT'S THE AMD 386 PROCESSOR!

Want the fastest 386?

Why settle for anything slower, the 40 mhz Am386DXL from Advanced Micro Devices is the fastest 386 chip on the market, hands down. Not only does it outperform all other 386 chips, it even outperforms many 486 processors too. When looking for a 386 or 486 PC, look for the Am386DXL-40; it's over 20% faster than 33mhz 386 processors, over 31% faster than the Cx486SLC-25, over 50% faster than the i486SX-20, and over 13% faster than the i486SX-25 (in MIPS as tested by Power Meter vers. 1.5). The data speaks for itself - don't *pay more and get less*.



According to a Jan. 14 1992 PC Magazine Review, the Am386/40 was faster than all other 386 processors, it was even faster than most available 486 processors!

Look under the hood.

The AMD processor is easy to spot. Just look for the logo to the left. It's the only way to get the fastest 386 performance at the price of an ordinary 386 PC.



More Power Per Dollar.

Not only is the Am386DXL-40 faster than the i486-25, it's a better value too! The AMD chip costs a lot less than the price of the



Compare the cost of the Am386DXL-40 against the i486SX-25 and the faster Am386 chip actually costs less! FastMicro really stretches your computing budget.

486SX and FastMicro passes the savings and performance gain on to you. Plus, there is no sacrifice in upgradability - read on!

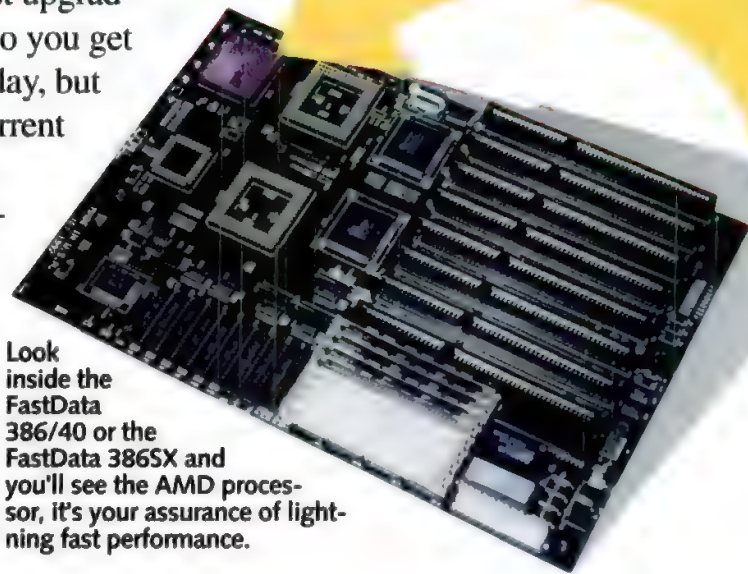
Certified Compatible - of Course.

The Am386 processor family is certified compatible with all 386 compatible hardware and software. It has flawlessly passed tests from every top computer publication and has been tested in over 100 different 386 systems (including FastMicro's) and passed all tests without a single failure or incompatibility. Its compatibility has even been certified by XXCAL Testing Labs.



Buy Today - Upgrade Tomorrow.

The FastData 386-40 is the most upgradable PC on the market! Not only do you get the most power for your money today, but you can upgrade your system to current and future 486 processors. Unlike competitors' very expensive proprietary upgrade cards, all you do is plug in a new processor & a \$20 clock crystal (the silver part at the top center of the board) and change some jumper settings. Processors & crystals are widely available. You can install i486DX, i486DX/2, i486SX, announced AMD 486 CPUs & even promised next generation upgrade processors, all up to 50mhz external clock rate (100mhz for DX/2s and



Look inside the FastData 386/40 or the FastData 386SX and you'll see the AMD processor, it's your assurance of lightning fast performance.

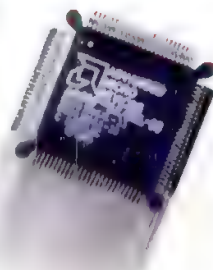
BUYER'S CHECKLIST

	FastData 386/40	Other 386's	Other 486SX's
386 Priced	X	X	
40mhz Performance	X		
486SX Overdrive Ugr.	X		X
486DX Upgradeable	X		
486DX2 Upgradeable	X		
Cache Upgradeable	X		?
170mb Conner Drive	X		
7 Drive Bays	X		
Dual Cooling Fans	X		
GE On-Site Service	X		
7th Year in Business	X	?	?

other doubler designs). That's more flexibility than other companies' 486 computers. FastMicro really maximizes value today and protects your investment tomorrow!

The Fastest 386SX Too!

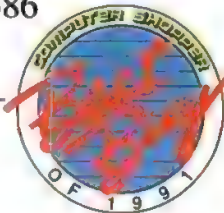
The latest high performance 386 processor from Advanced Micro Devices is the Am386SXL-33. It's 32% faster than 25mhz 386SXs and combined with FastMicro's 16K optimized cache, it boosts performance to 74% above normal 386SX-25 levels.



FastMicro's got the new Am386SXL/33

FastMicro includes the fastest 386 chips.

Don't settle for less, FastMicro's new 386/40, 386SX/25 & 386SX/33 utilize high performance 386 processors and do it at a price that will make ordinary 386 PCs obsolete. Plus FastMicro backs every PC with its award-winning support and service. Turn the page to learn more!



FASTMICRO PRESENTS THE FASTEST 386 PC'S

FastData 386/40

\$1499

INCLUDES

- Am386DXL™ 40mhz Processor
- 64K Static RAM Cache
- Upgradable to 486 Processors.
- 4 megabytes of high speed RAM.
- 170 mb 17ms IDE hard disk, 1:1 interleave with 32K cache.
- 1.2mb 5.25" & 1.44mb 3.5" drives.
- New Generation Desktop Case.
- 72hz Non-Interlaced 14" Super VGA color monitor, 1024x768 resolution.
- 16 bit SVGA card with 1mb Ram, 32,768 Colors & Windows Accelerator.
- Clock calendar, parallel port, game port and two serial ports.
- 8 expansion slots, 2 occupied.
- Microsoft Windows 3.1 & Mouse.
- MS-DOS 5.0.
- FastMicro Peace of Mind.



A System That's Cool & Quiet? FastMicro Innovates.



Every new desktop FastData PC comes with dual cooling fans. It has a main fan that's quieter than fans in ordinary PCs- plus, it includes a special second fan that comes on only when the system gets warm. A cooler system lasts much longer - a concern particularly when upgrading to higher heat-producing clock doubler chips.

Fourth Generation Case

Our new desktop case has been developed to afford maximum strength, expandability and protection in a versatile and compact design. From the minute you look inside, you know this is not like the minimum cost cases most of our competitors use. It includes no less than seven drive bays and has extra protection against radio interference.

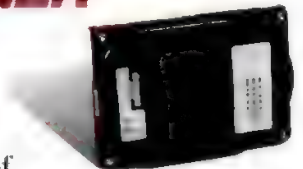
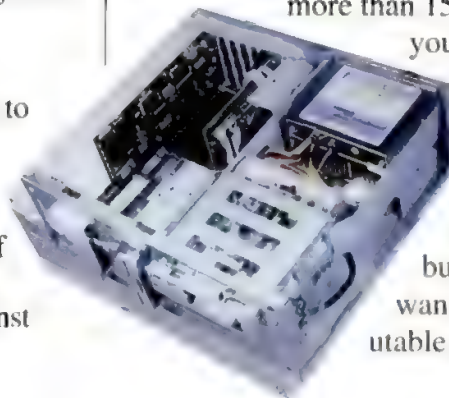
Powerful 170 Mb IDE Drive.

FastMicro includes Conner's CP-30174 170mb IDE hard drive standard in the FastData 386/40.

Conner has a reputation for building the most reliable drives on the market, in fact, the CP-30174 has a MTBF (mean time between failures) rating of

more than 150,000 operating hours. If

you ran your FastData system 24 hours a day - that's more than 17 years! Couple this with a <17 millisecond access time and 32K built-in cache and you won't want to gamble on a less reputable drive.



Ultra-Fast, Ultra Clear Video

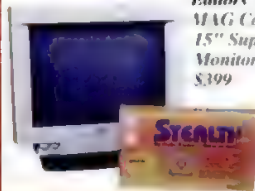
Order the FastData 386/40 and we'll include a High Performance Windows Video Accelerator Card at no extra charge. Its Tseng Labs ET-4000 graphics accelerator runs Windows *five times* faster than standard VGA cards and its Sierra Ramdac Hi-color chip delivers up to 32,768 colors. We top your system off with a Non-Interlaced Super VGA monitor with resolutions to 1024 x 768 and a sparkling 72hz refresh rate. Order either of our Am386SXL models and we include the non-interlaced monitor with a 1mb Super VGA Card (it's three times faster than standard cards).

Remember, when you buy from FastMicro, you can choose from hundreds of hardware and software products to enhance your system.



EDITOR'S CHOICE VIDEO BUNDLE

Upgrade your FastData 386 system to the PC Magazine Editors' Choice Diamond Stealth VRAM and the PC Magazine Editors' Choice MAG Colorview/15 15" Super VGA Monitor for just \$399



Legendary FastMicro Service

FastMicro backs up all FastData PC's with the most comprehensive service in the business. Seven day a week toll-free technical support is included for as long as you own your FastData PC. In the unlikely event a part should fail during the one year warranty, we'll express ship you the replacement part. If we still can't resolve the problem, we'll send GE on-site or replace the system at no charge.



GE Computer Service

"FastMicro has lasted while scores of other companies have come and gone"
-Computer Buyer's Guide 10/91

Why buy your PC from one company and your software and peripherals from another? FastMicro supports you better with our complete inventory of all the leading computer products at low FastMicro prices.

Satisfaction Guaranteed

We'd love to add you to the FastMicro family of satisfied customers. Every FastData 386 PC comes with our 30 day money back guarantee - you're going to very satisfied. Call 800-551-0386.

FastData386SX/25 \$1299

- Am386SXL™ 25mhz Processor
- 4 megabytes of high speed RAM.
- 120 mb 17ms IDE hard disk.
- 1.2mb 5.25" & 1.44mb 3.5" drives.
- Mini-Tower Chassis.
- 72hz Non-Interlaced 14" Super VGA monitor, 1024x768 resolution.
- 16 bit SVGA card with 1mb Ram.
- Clock calendar, parallel port, game port and two serial ports.
- MS-DOS 5.0, Microsoft Windows 3.1 & Mouse Included.

FastData386SX/33 \$1339

- Adds a 16K Static Ram Cache



FASTMICRO

1-800-551-0386

FastMicro, Inc.
4405 East Baseline Road
Phoenix, AZ 85044
Toll-Free: 800-551-0386
Fax: 602-431-8300

© 1992 FastMicro, Inc. Am386 is a trademark of Advanced Micro Devices. All other trademarks acknowledged. Prices and money back guarantee do not include shipping. PCM 7/92



SuperStor 2.0 \$77

Install SuperStor and double or triple the capacity of your hard disk effortlessly. SuperStor's data compression operates in the background and is so fast, it actually improves the performance of many of your applications. Its universal data exchange feature even allows compressed floppies to be read by other non-compressed systems.



Teac 1.44mb 5.25" \$59 or 1.2mb 3.5 Floppy Drive

Genuine Teac quality at a low FastMicro price. These high density floppy drives also read, write & format low density floppy disks. They work great with all true 286, 386 & 486 compatibles. 1.44 mb 3.5" drive includes mounting kit and bracket. For rails for 1.2mb 5.25" drive, add \$5.



Adobe Illustrator 4.0 \$395

Illustrator 4.0 for Windows brings unprecedented design & illustration power to the PC. It includes preview-mode editing, 24 bit color support, and incredible text-handling features. Ideal for the most advanced desktop publishers. Adobe Illustrator for Windows includes Adobe Separator and Adobe Type Manager with 40 fonts. Upgrade from competitive graphics software for just \$179.



FastData PowerWin VGA \$109

Run Windows six times faster than ordinary VGA! This 1mb VGA card features an ET4000 accelerator chip, maximum 1024x768 resolution, and standard 16 bit ISA compatibility. It also includes a Sierra RAMDAC chip which allows it to do 32,768 colors at the 800x600.



COMPUTER BOOKS 25% OFF PUBLISHERS' LIST

DOS BOOKS	
ABCs of DOS 5 - Sybex	15
DOS 5 Instant Ref - Sybex	10
Getting Started with DOS 5 - Microsoft	13
Mastering DOS 5 - Sybex	26
Using Excel 3.0 - Que	30
PC Mag Guide to	
Getting Started with MS-DOS 5 \$13	
A self-paced introduction to DOS 5, this book features the DOS 5 Shell. It teaches simple techniques for organizing files, running applications and managing in Word files.	
DOS 5 - ZD Press	19
Que's MS-DOS 5.0 User's Guide	22
Running MS DOS 5 - Microsoft	19
Supercharging MS-DOS 5 - Microsoft	19
SPREADSHEET BOOKS	
ABCs of 1-2-3 Window - Sybex	21
Mastering Excel 3.0 - Sybex	21
PC Mag Guide to Quattro Pro 3.0	19
PC Mag Guide to 1-2-3 Release 2.3	19
PC Mag Guide to 1-2-3 for Windows	19
PC Computing Guide to Excel 3.0	19
Quattro Pro 3 Companion - Microsoft	19
Running Excel 3 - Microsoft	21
Understanding 1-2-3 Release 2.3	20
Using Excel 3.0 - Que	21
Using Quattro Pro 4 - Que	21
WINDOWS BOOKS	
Mastering Windows 3.1 - Sybex	19
PC Mag Guide to Windows - ZD Press	19
Maximizing Windows 3.1 - New Riders	30
Running Windows - Microsoft	19
Using Windows 3.1 - Que	20
Windows 3.1 Revealed - Same	15
WORD PROCESSING BOOKS	
ABCs of WordPerfect 5.1 (DOS) - Microsoft	15
Mastering WordPerfect Windows	19
Mastering Ami Pro 2 - Sybex	20
Mastering WordPerfect 5.1 (DOS)	21
Running Office - Microsoft	21
Mastering Word for Windows 2.0	21
PC Mag Guide to Ami Pro - ZD Press	19
PC Mag Guide to Word for Windows	19
Running Word 5.5 - Microsoft	19
Running Word for Windows - Microsoft	19
Using WordPerfect 5.1 - Que	21
Using Word for Windows - Que	21
Using WordPerfect for Windows - Que	21
WordPerfect Windows Quickstart - Que	
21	
GENERAL BOOKS	
Mastering Microsoft Works - Sybex	20
Official Guide to Prodigy - Microsoft	15
PC Computing Guide to Quickstart	19
PC Mag Guide/Notebooks & Laptops	22
Upgrading & Repairing PCs - Que	22
Using Quicken 5 - Que	15
Using MS Works for Windows - Que	19
Works 2 Companion - Microsoft	17
PUBLISHING & GRAPHICS BOOKS	
ABCs of AutoCAD 11 - Microsoft	17
PC Computing Guide to	
Harvard Graphics for Windows	19
Mastering AutoCAD 11 - Sybex	20
Mastering CorelDRAW 2 - Sybex	20
Mastering Harvard Graphics (DOS)	20
Mastering Harvard Graphics Windows	20
Mastering PageMaker 4 - Sybex	20
Using PageMaker 4 - Que	22
Using Harvard Graphics 3 - Que	22
Using Microsoft Publisher - Que	22
UTILITIES & NETWORK BOOKS	
PC Mag Guide to Connectivity	30
PC Mag Network Tech. & Utilities	30
Understanding PC Tools 7 - Sybex	20
Understanding Norton Utilities 6	20
Using Novell Network - Que	22
LANGUAGE & DATABASE BOOKS	
GW Basic User's Guide & Reference	15
Learn C Now - Microsoft	30
Mastering FoxPro 2 - Sybex	22
Using \$21 WordPerfect for Windows	
The perfect introduction for WP Win, this text cover all basic concepts and sophisticated features. This complete tutorial & reference is ideal for all levels.	
Mastering QuickBasic 4.5 - Sybex	17
PC Mag T. Pascal 6.0 Tech. & Utilities	26
PC Mag Basic Tech. & Utilities	22
Running Office - Microsoft	21
QuickBasic Bible - Microsoft	19
Understanding dBase IV 1.1 - Sybex	21
Understanding Clipper 5.01 - Sybex	22
Using Paradox 3.5 - Que	22
Using Borland C++ - Que	22
Using dBase - Que	22
Waiting Group's C++ Prog. - Same	22
X - Books ideal for beginning users	

FAST MICRO DIRECT EXPRESS

DRIVES

NEC CD Gallery

\$559

Get a whole CD set-up at one low price. Includes NEC CDR-36 EXT. CD player, a pair of amplified speakers, stereo headphones and XT/AT interface. Also includes Grolier Electronic Encyclopedia, Time Table of History, World Atlas, TIME Almanac, National Geographic Mammals, Great Cities of the World, and Battle Chess CD's.



CD-ROM HW & SW

Artshow by Corel	159
Battle Chess or Carmen San Diego	45
Book of Mammals/ Encyclopedia	49/69
MS Bookshelf, Stat. Pack	
Hitchhike Ext. 680mb Kit	449
Pinnacle Internal CD-ROM w/Atlas	379
Pinnacle External CD-ROM w/Atlas	319
Soundblaster Pro w/Int. CD Kit	559
Sony Int. CD Drive Kit	349
World Atlas & Consultant	99
MS Multimedia Beethoven	55
MS Multimedia Bookshelf	125
World Atlas or U.S. Atlas	45

Seagate

130mb IDE Kit \$339

IDE performance, big 130 megabyte capacity, 19ms access time and 5 mbps transfer rate make this a great buy. Controller cables and rails are included to make installation fast and easy.

Colorado	
DJ-10 40-120mb Int. Tape	199
DJ-20 80-240mb Int. Tape	259
External Kit w/AB11	99
DTC	
6280 ESDI 18bit HD/FD Cont.	119
6280-15T 24mb/sec transfer rate	169
Micropolis (see DTC Controllers)	
MC1664 345mb HH ESDI 14ms	899

DRIVES CONT.

MC1568 666mb FH ESDI 14ms	1399
MC1518 1.3gb FH ESDI 14ms	2399
NEC Ext. CD Gallery w/CDR36	559
Plus Development	
HardCard IXL 50mb 9 ms 16bit	299
HardCard IXL 105mb 9 ms 16bit	469
Seagate	
30MB XT Kit ST238 w/ cont.	249
40MB AT ST351X 28ms IDE Drive	189
88MB ST3096A 19ms IDE Drive	279
125MB ST3144A 19ms IDE Drive	319
210MB ST2139A 15ms IDE Drive	599
330MB ST2383E 16ms ESDI	1199
330MB ST2383A 16ms IDE	1199

Teac	
1.2MB 5.25" Floppy	59
1.44MB 3.5" Floppy	59
Toshiba	
360K 5.25" Floppy (Black)	59
1.2MB 5.25" Floppy	59
1.44MB 3.5" Floppy	59
Western Digital	
WDAC280 80mb IDE 20ms	Call
WDAC2120 120mb IDE 20ms	Call
WDAP4200 200mb IDE 20ms	599

MODEMS

ATI	
2400 ETC V.42 Int. / Ext.	109/129
9600E External MNP V.42bis	369
Everex 2400B Int. Modem	65
Hayes	
Optima 9600 Ext.	379
Optima 9600 Ext. w/ Fax	Call
Ultra 144 Ext.	699
Pocket Edition 2400 Modem	119
Intel	
Classic 2400 Modem Int. / Ext.	139/169
Satisfaction Classic - Int 9600	319
Practical Peripherals	
2400B Int. Modem Std/MNP	79/119
PM9600SA Int. / Ext.	279/299
PM14400FX Int. / Ext.	379/419
USRobotics	
2400 Sportster MNP Int. / Ext.	149/159
9600 Sportster Int. / Ext.	399/449
Conner HST 14,400 Int. / Ext.	539/559
Conner HST 14,400 Dual Std Ext.	799
ZOOM	
2400b Internal Modem	59
2400 V 42bis External Modem	119
9624 Send/Receive Int. Fax Modem	79

MICE & INPUT

Kurta XLP1212 \$259

Whether you're a graphics or CAD user, the XLP is easy to use. Drivers include AutoDesk ADI and Windows 3.1 support. Bundle includes 4-button cursor, pen and lifetime warranty. Kurta XLP-1218 available for \$529.



Key Tronic 101 Keyboard	59
Logitech	
Mouseman Serial right-hand	65
Mouseman Serial with Windows	105
Mouseman Bus right-hand	65
Mouseman Cordless	85
ScanMan 32	139
ScanMan 32 with Calchword	179
ScanMan 256 for Windows	259
Trackman 9/25	75
Microsoft	
Serial or Bus Mouse only	83
Serial or Bus with point	95
Serial with Windows	147

NETWORKING

Artisoft/Lantastic	
Lantastic Two Station Starter Kit	349
2 Mbps	469
Ethernet	469
Ethernet Additional Stations	209
Eagle NE2000 2 Station NW Lite Kit	459
NE1500 16 Bit 10baseT Adapter	149
FastData NE2000 16 Bit 10-BaseT	109
Intel EtherExpress 16 or 16TP	129
Novell Network Lite	85

VIDEO & MONITORS

ATI	
Graphics Vantage 1mb	299
VGA Basic 16 / Integra	65/89

VIDEO CONT.

VGA Wonder XL 256K / 1mb	159/189
Graphics Ultra 8514+VGA 1mb	479
Diamond	
SpeedStar24 16 Million Colors	179
Stealth VRAM H-Color 1mb	265
Everex EGA 480 Card	69
FastData Monitors & Cards	see above
Hercules Graphic Card +	Call
MAG Colorview/15	Call
Mitsubishi	
1410 EGA Monitor	259
Diamond Pro 14	369
Diamond Scan 16L	919
NEC	
Multisync 3FGX	669
Multisync 4FG	799
Multisync 5FG	1399
Orchid	
ProDesigner II 1mb	219
Farenheit 1280s H-Color	319
Panasonic C1381 VGA1024	329
Radius Color Pwot w/ Card	1099
Seiko CM1440 /CM1450	489/569
Sony 1304 Multiscan	599
Video 7	
CoStar VGA 512K/1MB	139/169
V-RAM II Ergo VGA 1mb	319

Hayes Ultra 144 Smartmodem \$699

The best choice for high speed data transfer, the Ultra 144 includes V.32bis for 14,400 bps and V.42bis for 38,400 bps throughout. With SNA, X.25 & ISDN network connectivity, the Ultra 144 is supported by virtually all applications. Also includes MNP 2-5 error control and exclusive Hayes V-series compatibility.

PRINTERS CONT.

Panasonic 4410 Laser \$649

The Panasonic KX-P4410 includes 5 PPM, HP HP emulation, a large 200 sheet paper tray and 28 standard fonts. It works with all current major software programs, has 512K of upgradable memory, and has an EZ-net LCD panel.



Okidata	
Okulaser 400	599
Pentax	
KXP1180 9 Pin	149
KXP1123 24 Pin	199
KXP1124 High Speed 24 Pin	279
KXP1624 24 Pin Wide	339
KXP2180 Quiet 9 Pin	179
KXP2123 Quiet 24 Pin	259
KXP2124 Quiet 24 Pin	Call
KXP21KX Series Color upgrade kit	59
KXP2624 High Speed Quiet 24 Pin	399
KXP4410/4430 Laser	649/Call
KXP4450 Laser	1069
KXP4455 Laser	1699
QMS PS410	1599
Seiko Smart Label Printer Plus	139

BOARDS & CHIPS

ATI Stereo F/X	
2400 Sportster MNP Int. / Ext.	149/159
9600 Sportster Int. / Ext.	399/449
Conner HST 14,400 Int. / Ext.	539/559
Conner HST 14,400 Dual Std Ext.	799
Creative Labs	
MediaStudio Kit CD-ROM & SB Pro	559
Sound Blaster	95
Sound Blaster Pro (stereo & MIDI)	179
Video Blaster	319
Cyrix 387-DX25/33/40	169/179/199
387-SX16/20/25	99/109/119

Everex	
RAM3000 16 bit - w/ OK (max 3mb)	125
RAM3000 16 bit - w/ 1mb	75
RAM8000 16 bit - w/ OK (max 8 mb)	169
RAM8000 16 bit - w/ 2mb	269
Intel 287XL	75
387-DX	209
387-SX16/20	119/129
Memory - 1mb SIMMS 80ns	339
Memory - 1mb chips 80ns set of 9	549

PRINTERS

Canon	
BJ10EX Portable	319
BJ300 / BJ330 Ink Jet	459/599
LBP-4 Plus	899
Citizen	
200GX 9 Pin	159
GSX-130 24 Pin	249
GSX1400 24 Pin	295
GSX145 24 Pin Wide	395
PN48 Std / Pro	299/329
Co Star LabelWriter II/Plus	179/289
Epson	
HP II, IIp, or III 1/2mb Upgrade	99/129
OKI 400 1/2mb Upgrade	129/189
Pana. 4420, 4450 1/2mb Upg.	119/169
NEC	
P3200 24 Pin	239
P3300 24 Pin Wide	339
P6200 / 6300	419/599
Colomate PS Model 40	4499
Silentwriter 2 Model 95	1444

Traveller 9624FP \$109

Ideal for portable and notebook computers, the Traveller Pocket FaxModem includes 9600/4800 bps send/receive fax and 2400bps modem with V.42 bis & MNP 2-5 for 9600bps throughput. It's runs on a nine-volt battery or supplied AC adapter and includes software and modem cable too! It's built in the U.S. and has a 2 year warranty.



Star

NX1001	139
10240 / 2415	189/369
Texas Instruments	
Microclaser Plus PS17	1199
Microclaser Plus PS35	1499
Microclaser PS35 Turbo	1999

FASTDATA PRODUCTS

FastData Boards	
16bit 1mb VGA	69
16bit 256K VGA	45
2400B Internal Modem	49
9600B Send/Rec. Fax w/2400B	69

1mb SVGA Card \$69

Resolution up to 1024x768 & 256 Colors, 16 bit interface and Trident VGA chip make the FastData 1mb SVGA card a great buy. Its compatible with all standard compatibles & VGA/SVGA monitors.

CGA Card	
Ethernet 16bit 10Base-T	109
IDE 16 Bit Hard Floppy Disk Cont.	29
IDE +HD/FD w/Par2 Serial/Game	39
MGP Card	29
Parallel 2 Serial Game Card	29
RLI 16bit 1.1 Hard Floppy Disk Cont	59
XT 144 Dual Floppy Controller	35

FastData Monitors

14" Amber or White TTL Mono. \$99

FastData 2496 SR FaxModem \$69

A great value, the FastData 2400 baud internal modem with

CALL OUR TOLL-FREE ORDER LINE:

1-800-441-FAST

DATABASE & FORMS

askSam 5.0	209
Claron Personal Developer	45
Claron Professional Developer 3.0	449
Cipper 5.01	489
DateEase	509
dBase III+	419
dBase IV 1.5	479
w DBfast for Windows	319
dBXL V	129
FormTool Gold	52
Formiller	79
w FormWorks	139
Formbase Plus	229
FormPro	449
Paradox 4.0	Call
Paradox Competitive Upgrade	165
Paradox SE	65
Per Form Designer & Filer	89
w Per Form Pro	179
Personal Rbase	69
Q & A 4.0	249
RapidFile	189
Rbase for DOS	447
Reflex	159

DESKTOP PUBLISHING

Bannermania	21
Express Publisher DOS/Win	99/165
w Microsoft Publisher	129
w Pagemaker	469
w PFS Publisher	69
Printshop	33
Publisher's Paintbrush	279
Publish III	69
w Ventura Publisher for Windows	499
w Ventura Database Publisher	179

ENTERTAINMENT



Lotus SmartSuite for Windows \$449

Get more out of Windows 3.1 with SmartSuite. Four full-featured Lotus applications including: 1-2-3 for Windows, Ami Pro for Windows, Freelance Graphics, and cc Mail. These leading edge applications in SmartSuite share more than just the Lotus name. They share innovations like SmartIcons for one-click access to the tasks you perform most. SmartSuite offers easy, consistent installation, menus, displays and help tools.

AutoMap U.S.A./Europe	45/75
BodyWorks/Orbits	39/29
Carmen San Diego Deluxe Edition	45
F-19 Stealth Fighter	45
Falcon 3.0	45
King's Quest 5 (VGA Vers.)	38
Leisure Suit Larry V	39
w Microsoft Ent. Pack 1, II or III	27
Microsoft Flight Simulator	38
Aircraft & Scenery Designer	27
w Microsoft Golf	35
PC Globe or PC USA	35
Simcity or Simcity for Windows	28
SimEarth	39
Wing Commander II/III	39/45

FINANCIAL

QuickBooks with QuickPay \$109

QuickBooks is the complete book-keeping program for non-accountants. Complete bookkeeping with invoicing, bill paying, A/R, A/P, Cash flow reporting, complete business reporting & more. Includes QuickPay, the easy-to-use payroll software that calculates deductions, tracks tax information & more.



ACCPAC BPI Value Pak	359
ACCPAC Simply Accounting DOS	119
w ACCPAC Simply Acctg Windows	119
DAC Accounting 4.2	85
DAC Bonus Pack 4.2	119
DAC Accounting Upgrade	45
Managing Your Money	47
w Microsoft Money for Windows	45
Money Matters	29
w M.Y.O.B.	129
One Write Plus G/L, A/P & A/R	79
Pacioli 2000	29
Peachtree Basic Acctg.	69
PeachPay	49
w Peachtree Acctg. for Windows	69

SOFTWARE

= Windows Software

FINANCIAL CONT.

Peachtree Complete 6.0 (with DQ)	169
Peachtree Network Accounting	279
w Quicken for Windows	41
QuickBooks	85
QuickBooks with QuickPay	109
The Manager's Organizer	179
Timeslips II	139
Wealth Builder	89

GRAPHICS

w 3-D Charts to Go for Windows	55
w Adobe Illustrator 4.0	395
Autosketch 3.0	139
w CA-Correl Draw	175
w Corel Draw 3.0	369
Design CADD 3-D	235
DrawPerfect	259
w Freehand	Call
Freelance Graphics 4.0	299
w Freelance Graphics for Windows	299
Freelance Competitive Upgrade	89
w Hollywood	299
Generic 3D Drafting	199
Generic Cadd Level 2 Starter Kit	85
Generic Cadd 6.0	279
Harvard Graphics DOS	Call
w Harvard Graphics Windows	449
w Micrografix Designer	309
w Microsoft Powerpoint	109
PC Paintbrush IV Plus	319
w Persuasion	279
w Publisher's Paintbrush	Call
w Windows Draw	89

SPREADSHEETS CONT.

w 1-2-3 for Windows Comp Upgrade	99
Always	115
w Excel 4.0	299
w Excel 4.0 Comp/Vers. Upgr.	119/95
Quattro Pro 4.0	299
Quattro Pro 4.0 Comp Upgrade	89
Quattro Pro SE	45
w Quattro Pro for Windows	Call
Supercalc 5.2	89

WORD PROCESSORS

w Ami Pro 2.0	279
w Ami Pro 2.0 Comp Upgrade	89
w CA-Text	135
w Correct Grammar	57
Facelift for WordPerfect	57
w Grammatik IV for Windows	55
Grammatik V	55
w JustWrite	125

WordPerfect for Windows \$249

The #1 Word Processor comes to Windows! WordPerfect 5.1 for Windows is simple, powerful, and fun to use. WPWin includes customizable ButtonBar™, Dynamic Data Exchange, and full graphical integration. Upgrade from WP for DOS for \$79.

LetterPerfect	85
w WordPerfect for Windows	249
Microsoft Word for DOS	209
w Microsoft Word for Windows	299
w Pro Write Plus	159
Multimate 4.0	239
PC Write Standard Level	Call
Professional Write	159
Publisher's PowerPak / WordPerfect	45
RightWriter DOS	55
w RightWriter for Windows	55
WordPerfect 5.1	249
w WordPerfect for Windows	249
w WordPerfect DOS to Win Upgrade	79
WordPerfect Add'l Station License	159
WordPerfect Office	89
w WordStar for Windows	89
WordStar Pro	259
Writer's Toolkit DOS/Windows	79/79

UTILITIES - DOS

386 MAX	59
Address Book Plus	47
Calendar Creator Plus	39
Carbon Copy Plus	107

Close-Up 4.0 Dual Pack \$119

Winner of PC Magazine Editor's Choice & PC World's Best Buy. Close-Up is the ideal way to run another PC remotely via modem. It runs remote DOS and Windows applications with the fastest remote screens and file transfers ever. Special Dual Pack includes host & remote.

Central Point Anti-Virus	79
Central Point Backup	75
Central Point Commute	79
Checkit	79
Company Ladder	45
CoreFast	60
Desqview 2.4	75
Desqview 386 2.4/6.0	125
Direct Access	57
Disk Manager Dos / Novell	36/119
Disk Optimizer	29
DR DOS 6.0	65
Fastback Plus	109
GoScript 4.0	89
HulaK	125
InfoSpotter	45
Labels Unlimited	59
Laplink Pro	95

UTILITIES - DOS CONT.

Microsoft Learning DOS	55
MS-DOS 5.0 Upgrade	55
Norton AntiVirus	79
Norton Backup	109
Norton Desktop for DOS	109
Norton Utilities	109
PC Anywhere IV	109
PC Tools Deluxe 7.1	105
Personal Lawyer	15

Outside In for Windows \$119

Outside In for Windows is a file viewing and data import utility. It lets you reuse data that already exists. Use Outside In to quickly look at a fully formatted view of a file. Select all or part of the file and outside in will copy data to the clipboard for use in any program. Use the power of Windows without giving up all of your DOS files.

P.D. Queue	55
Pop Drop Plus	53
PrintFile	19
ProComm Plus	65
Prolog	25
QA Plus	85
QEMM 386 6.0	57
QRAM 2.0	49
SideKick 2.0	59
Sideways	55
Smartcom Exec	89
Sprint II	69
Stacker	89
Stacker XT8 / AT16	149/179
Super PC Kwik	49
Virex-PC	75
XTree Gold 2.5	89

UTILITIES - WINDOWS

w Adobe Type Sets	Call
w Adobe Type Align	59
w Adobe Type Manager	59
w Adobe Type Manager Plus Pack	115
w After Dark for Windows	25
w BeckerTools	37
w Bitstream MakeUp	89
w CA-Up To Date	89
w CA-SuperProject for Windows	539
w Direct Access Windows	60
w Instant Orgchart	119
w MicroPhone II	89
w Microsoft Mouse w/ Windows 3.1	147
w Microsoft Productivity Pack	39
w Microsoft Project for Windows	429
w Microsoft TrueType Font Pack	55
w Microsoft Windows 3.1	89
w Norton Backup	85
w Norton Desktop	109
w On Target	239
w PackRat 4.0	239
w ProComm Plus for Windows	85
w Publisher's Powerpak	45
w WideAngle for Windows	75
w Winconnect	59
w WinFax Pro	69

Windows 3.1 Upgrade \$45

Microsoft Windows 3.1 is the upgrade of the year. Faster, easier, safer and more powerful. Microsoft has made 100% of improvements to benefit advanced users and novices alike. It includes new TrueType™ scalable fonts and new MultiMedia features. It includes an improved File Manager, faster and more efficient memory use, Express Install, improved printing speed, new built-in tutorial, special enhancements for laptop users, and a whole lot more. To upgrade, you must have an earlier Windows version.



Notebook Software Essentials \$97

Save big on this special bundle of DOS productivity software and utilities for the active notebook computer user. Includes PC magazine's Editor's choice FastLynx file transfer software with parallel and serial cables. Also includes FastLock password protection, FastJuice battery monitor, MergeIt phonelist, Siftback hard disk backup, Maximizer contact manager, C.O.S. session remote access, EZC smart cursor and more!



IMSI Publisher \$57

Complete desktop publishing and word processing in one easy program. All the tools you need to create resumes, newsletters, reports, flyers, business letters and more. A powerful WYSIWYG word processing that makes writing and editing a breeze. Publisher makes designing your document fast and easy, with flexible style sheets that automate page formatting. Nine zoom levels that show everything from the smallest of details to your complete document layout.



After Dark 2.0 \$25

After Dark is the most advanced screen saver for Windows. Choose from over 40 savers, including the famous Flying Toasters. You can also password protect entry to Windows with Windows Shutter. SystemIQ monitors activity and maximizes performance while running After Dark. Also includes digital sound and DOS blanking.



FASTMICRO DIRECT EXPRESS

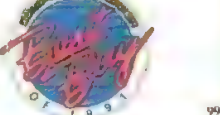
- ### Ordering Information

 - No Charge for Visa, MasterCard, Discover Card or American Express.
 - Purchase orders accepted (no surcharges) from approved corporations only.
 - Minimum phone order: \$50.
 - Prices/availability subject to change.
 - Sorry, no COD's.
 - AK orders add 6.7% tax.
- ### Returns & Warrantee Information

 - Product warranties, offers & claims are handled by the manufacturer (all FastData branded products are warranted through FastMicro).
 - Compatibility is not guaranteed (except on FastData products).
 - No returns on used items (except FastData branded products).
 - All opened returns are subject to 15% restocking fee (except FastData branded products).
 - DOA's repaired or replaced at our option.
 - Call for return authorization (RA) before returning product.
 - Sorry, shipping is not refundable.
- ### Shipping Information

 - All orders up to 20 pounds are shipped via Airborne Express.
 - Shipping & handling charge: 3% (Min \$6).
 - AK, HI, & APO addresses add \$15 per box.
 - Personal/company checks delay shipping.
 - International orders: Fax 602-437-8622 for shipping costs before ordering.

Mailing Address:
FastMicro, Inc.
4405 E. Baseline Road
Phoenix, AZ 85044
To place orders call: 800-441-3278
For customer service call: 602-431-8100
Canada/Local call: 602-431-8200
FAX: 602-431-8300



The Best Peripherals... The Best Prices

SPECIAL PRICES ON THESE PRODUCTS

Viva 14.4/FAX Features:

- 100% Hayes Enhanced AT Command Set compatible • 4.2Kbps
- 4.2Kbps & 14.4Kbps data compression • 4.2Kbps & 14.4Kbps

\$295



Includes Quick Link II FastFax & 5 Year Warranty

14.4/FAX also available as internal modem for **\$240**

COMPUTER PERIPHERALS, INC.

Courier HST Dual Standard™

• Supports both COM1 & COM2 14,400 bps and HST 16,800 bps data transmission • V.42/MNP 2-4 error control • V.42bis/MNP 5 data compression • Reproducible to 28,000 bps when available • Non-volatile 128Kbit SRAM for 128



UL Robotics \$725

ISA 16/4 Token Ring Adapter

• Supports data transfer rate between PC network & 4 token ring network • Optimized high performance NetWare, Novell 3.11, Open, Microsoft LAN Manager and IBM OS/2 LAN drivers • Integrated shielded & unshielded twisted pair support w/on-board media filter • Automatic PC bus type detection • Data transfer using 8085 master DMA mode in PC/AT • Data transfer using 8085 master mode in PC/XT • Separable 16 Mbit/s at 4 Mbps Token Ring Network speed • Compact dimensions ideal for portable PCs



Easy Installation • 3 Year Warranty

olicom \$388

Modems from ONUVO

VOYAGER 96424FX

External Send/Receive Packet data fax modem. 9600 baud/4000 receive fax, data modem. 2400 baud w/7.2Kbps throughput 9600bps software implementation, compatible w/Class 1 fax commands. For IBM PC's, Compatibles and Apple Macintosh.

\$96

NUVOTEL 969241FX

Internal Send/Receive fax modem. 9600 Send/Receive fax, data modem 2400 baud w/4.2Kbps throughput 9600bps Class 1 & 2 fax commands. Hardware implementation.

\$49

Tape & Floppy Drives

CHINON AMERICA, INC.	
1.44 3.5" Floppy w/frame	\$49
1.2 5.25" Floppy	\$52
COLORADO MEMORY SYSTEMS	
Colorado Jumbo 120	\$188
Colorado Jumbo 250	\$249
Colorado QFA 700	\$599
Accessories and interfaces in stock, please call.	
TEAC CORP. OF AMERICA	
1.44 3.5" Floppy w/frame	\$53
1.2 5.25" Floppy	\$55
FD505 1 2 & 1 44 HH Combo NEW!	\$125

CD-ROM

MAGNAVOX	
461RS External w/Software	\$389
CM205XRS Internal 375 ms w/Software	\$375
CM205XKB Internal 375 ms Drive Only	\$325

Hard Drives

CONNER PERIPHERALS	
40MB IDE 3.5"/80MB IDE 3.5"	\$175/259
120MB IDE 3.5"/200MB IDE 3.5"	\$300/545
170MB IDE 3.5"/510MB IDE 3.5"	\$366/1029
MAXTOR	
MX7213A 200MB IDE 3.5"	\$439
60MB IDE 3.5"/120MB IDE 3.5"	\$255/309
SEAGATE	
ST351A 40MB IDE 3.5"	\$175
ST3144A 120MB IDE 3.5"	\$299
TEAC CORP. OF AMERICA	
SD 3105 105MB IDE 3.5"	\$249

Monitors

CTX	
5468 1224 x 768 .28	\$269
5468 NI 1024 x 768 .28	\$299
1760DF17 SVGA 1280 x 1024 .26	\$835
MAGNAVOX	
CM9039 14" 640 x 480 .39	\$228
CM9079 14" 1024 x 768 .39	\$259
CM9089 14" 1024 x 768 .28	\$289
CM9217 17" 1024 x 768 .31 DCA	\$865
20CM84 20" 1280 x 1024 .31	\$1299
7BM749 14" White VGA	\$112
NEC	
3FGX MultiSync 15"	\$618
4FG MultiSync 15"	\$738

Videocards

ATI	
VGA WONDER XL 1MB	\$139
Graphics Ultra 1MB	\$389
8514 Ultra Plus 1MB	\$379
BOCA RESEARCH	
Super VGA 1MB	\$109
DIAMOND	
SpeedSTAR 24 x w/1MB	\$162
Stealth w/1MB	\$215
PC LOGIC	
V1000 16 Bit VGA 256K	\$28
SAMTEK	
VC126 16 Bit VGA 1MB	\$59
STB	
STBAVGA1 16 bit 800 x 600 256K	\$34
Evolution VGA 16 bit 1024 x 768 1MB	\$84
Windex Ultra Accelerator	
1024 x 768 1MB	\$229

Modems

COMPUTER PERIPHERALS	
2400 Internal/External	\$39/67
2400 Pocket	\$79
296WIN 9600 FAX 2400 Internal	\$109
9600 FAX Card 2400 Internal	\$87
9600 External V.42 MNP	\$265
14.4 Internal with FAX	\$240
14.4 External with FAX	\$295

HAYES	
Optima Pocket Edition 2400	\$108
Optima 2400 Internal	\$122
Optima 9600 V.32 Internal	\$349
Ultra 9600 14.4 V.32 External	\$838
Ultra 9600 External	\$599

INTEL

Satisfaction Modem 200/400	\$306/406
----------------------------	-----------

PRACTICAL PERIPHERALS

2400 Internal/External	\$74/98
2400 Internal Fax Modem	\$89
Pocket 2400	\$98
9600 Internal	\$258
9600 14.4 External w/FAX	\$388

US ROBOTICS

16.8 External HST	\$518
16.8 External HST Dual Std.	\$725

Math Co-Processors

INTEL	
387-20/25/33	\$85
387-SX 16/20	\$79
ULSI SYSTEMS	
Mathco 387-SX 16/20/25	\$55/55/58
Mathco 387-20/25/33	\$63
Mathco 387-40	\$79

Chips

256 x 4 chips	\$4
256K/1MB Simms	\$11/34
4MB Simms 70 nano	\$139
AST 4MB Premium II	\$229
Compaq 4MB 386	\$239
IBM Model 70 and 80 4MB	\$219
NMB 1MB-9-05/1MB-9-04	\$48/51

Networking Products

ARTISOFT	
Lanastic Starter Kit	
2mbps/AE2/AE3	\$325/448/529
Lanastic LAN Cards	
2mbps/AE2/AE3	\$129/198/229
E143 Ethernet Adapter Kit	\$198
3COM	
Etherlink II/Five Pack (3C503)	\$159/700
Etherlink II 10 Base T/	
Five Pack (3C503TP)	\$169/719
Etherlink 16 (3C507)	\$279
CNET	
8 bit/16 bit Ethernet	\$97/112
IBM	
Token Ring Adapter	\$598
NOVELL	
Novell Lite	\$69
Ethernet NE1000/NE2000	\$129/155
Network V2.2 5 User	\$485
Network V2.2 10 User	\$1079
Network V2.2 50 User	\$1859
Network V3.11 5 User	\$629
Network V3.11 10 User	\$1399
SMC	
Ethercard +/-16	\$119/149
THOMAS CONRAD	
TC6242/TC6242-TP+	\$69/99
TC6245/TC6245-TP+	\$199/219
TC4045 16/4 Token Ring	\$499

Printers

CANON	
BJ10EX Bubble Jet	\$319
CITIZEN	
GSX 140+	\$299
EPSON	
LX 810	\$155
LQ570/LQ870	\$258/434
FX850/FX1050	\$289/379
LQ1070/LQ1170	\$374/575
Action Laser II 6pp	\$675
LQ2500	\$848
DFX5000/8000	\$1269/2139

HEWLETT-PACKARD	
CPI Superset + 425 Fonts in 1	\$206
Deskjet 500/500C	\$408/735
Laserjet III w/Toner	\$1519
Laserjet IIP + w/Toner	\$808
Laserjet IIIP w/Toner	\$1027
1MB upgrade kit	\$79
2MB upgrade kit	\$118
4MB upgrade kit	\$185
Pacific Page/XL	\$278/648
OKIDATA	
ML320/321	\$309/435
ML380	\$219
ML390+/393+C	\$435/579
ML393+/393+C	\$979/999
OL400/800 Laser	\$599/929
OL820/840 Laser	\$1239/1599
PANASONIC	
1180i	\$152
1123/1124i	\$199/275
1624/1654	\$339/519
1695/2624	\$369/399
4410/4430	\$649/899
4450i/4455	\$1079/1719

Input Devices & Accessories

Logitech Fotoman Digital Camera	\$499
Logitech Mouseman Cordless	\$83
Logitech Mouseman Serial/Bus	\$69
Logitech Trackman Serial	\$54
Microsoft Mouse	\$89
Microsoft Mouse w/Windows 3.1	\$145
Z-NIX Mouse w/Windows 3.1	\$69
101 Click Keyboard	\$39
101 Membrane Keyboard	\$29

Notebook

MIDERN COMPUTERS*	
386SX-25 80MB 2MB RAM	\$1529
386DX-33 120MB 4MB RAM	\$1839
486DX-33 120MB 4MB RAM	\$2279
*All the above models include DOS 5.0, Windows, carrying bag and numeric keypad.	

Motherboards

AMLI	
V286-20 AMI BIOS	\$69
V386 SX-25 AMI BIOS	\$109
V386 DX-33 w/64K Cache AMI BIOS	\$179
V486-33/V486-50 w/256K Cache AMI BIOS	\$559/799
MICRONICS	
33GCP4DXB 486-33 ISA 256K Cache	\$709
50GCP486B 486-50 ISA 256K Cache	\$1199
33ICP486EII 486-33 EISA	
256K Cache	\$1029
50ICP486EII 486-50 EISA-Local Bus 256K Cache	\$1488

Software

Aldus Pagemaker	\$469
Carbon Copy	\$110
Clipper 5.0	\$489
Corel Draw	\$367
dBase IV	\$488
Freelance Plus	\$309
Foxbase/FoxPro	\$195/448
Harvard Graphics	\$358
Lotus 1-2-3 2.3/3.1+	\$345/379
Lotus for Windows	\$415
Microsoft DOS 5.0	\$79
Microsoft Excel/	
Word for Windows	\$299/319
Microsoft Windows 3.1/Word	\$89/219
Norton Anti-Virus	\$85
Norton Utilities 6.0	\$115
Peachtree III Complete	\$139
PC Tools 7.1	\$79
WordPerfect 5.1	\$255
WordPerfect Windows	\$259
Ventura Desktop Publishing	\$489

Peripheral Express WE EXPORT!

For Orders and Quotes

1-800-299-0200

MasterCard VISA

No surcharge for credit cards.

Hours EST:
8:30 AM - 7:30 PM Weekdays
11:30 AM - 2:00 PM Saturdays

PO Box 2047, Norcross, Georgia 30091
Customer Service: (404) 246-9566
Technical Assistance: (404) 448-2708
FAX (404) 449-1528

TERMS AND CONDITIONS:
Price and availability subject to change without notice. Purchase orders accepted from qualified customers. Shipping and handling 3-1/2% minimum \$10. APO and FPO add 5%. Product warranties, offers and claims are handled by the manufacturers. DOA's repaired or replaced at our option during the first 30 days only. No returns on good items. All return shipments are subject to a 15% restocking fee. Defective software replaced with same item only. Call 404-448-2708 for a return authorization number prior to returning any product. Shipping charges not refundable. Peripheral Express cannot guarantee compatibility.

THE WORKING WORD

Upgrading Printer Drivers: Don't lose your paper definitions when you upgrade

BY M. DAVID STONE

Upgrading Printer Drivers

Here's a warning for WordPerfect users who are also Hewlett-Packard LaserJet III owners and are thinking of taking advantage of HP's offer for upgraded printer drivers. I recently requested and received the latest WordPerfect and Windows drivers from HP. A few days after installing the drivers, I discovered that except for the standard set of definitions for paper size and type, all my paper definitions—more than 40 of them—were gone.

According to WordPerfect, each paper definition is stored in the WordPerfect printer driver file (identified with a .PRS file extension). If you upgrade to a new driver, you lose the definitions, and there is apparently no way to transfer the paper definitions to the new file.

If you have enough definitions, you may decide that it's not worth the hassle to upgrade, since it means you have to reenter them all. However, there is a way to take advantage of the new driver file and still have the definitions in the old file. Simply rename the old file so that you have it available on-disk, and then use whichever printer driver file is appropriate.

*Dave Ussell
La Verne, California*

► **PC MAGAZINE** This potentially bothersome issue actually has a somewhat wider applicability than this letter suggests. If you happen to have more than one printer—or one printer with more than one emulation—you'll also find that you have to enter each paper definition separately into each printer driver that you want to use. According to WordPerfect representatives, the ability to copy paper definitions between .PRS files is on a list of possible future features. But until it be-

comes reality, you'll have to make do.

For now, the general solution to this problem is to always record the procedure for each paper definition as a macro. If you need to enter the definition in another printer file—whether immediately or after some future upgrade, you can then simply run the macro. However, this will only help for definitions you create from now on, and then only if you remember to record the macro.

If you find yourself stuck with lots of paper definitions without macros, and you want to upgrade your driver, then keeping both drivers on-disk is a reasonable interim workaround, until you find the time to enter the definitions into the new driver file manually. With WordPerfect 5.0 or 5.1, first copy your old printer driver to a new filename in the same directory, keeping the .PRS extension. Then use the standalone PTR program that comes with WordPerfect to modify the printer name as stored in the driver.

To change the name, first run PTR at the DOS prompt, along with the copy of the driver, by entering:

```
PTR FILENAME .PRS
```

The opening screen will show you the printer name as it appears in WordPerfect when you select printers. Choose 3 (Rename) from the menu, and modify the printer name so you'll be able to distinguish it from the same printer listed in the new driver. Hit Enter when you've finished typing the new name, then F7 to exit. Saving the modified .PRS file and exiting back to DOS follows essentially the same procedure as saving a file and exiting WordPerfect.

Next, go into WordPerfect, hit Shift-F7, Select Printer, Additional Printers, List Printer Files, highlight the filename you've just modified, choose Select, and

then follow the normal procedure for adding a new printer.

When you finish, the new printer name will appear as one of the choices on the Select Printers screen. You can then switch between the old driver and the new driver at any time by pressing Shift-F7 and choosing Select Printer.

Note in passing that although these comments are focused on WordPerfect 5.0 and 5.1, the same problem and underlying concepts apply to WordPerfect for Windows. However, there is one important difference. If you're printing with the Windows driver in WordPerfect for Windows, settings are not stored with the Windows driver. Furthermore, page definitions are limited to creating label definitions that will fit on whatever page size is defined in the Windows driver.

If you're printing from WordPerfect for Windows with the WordPerfect driver, however, exactly the same considerations apply as with DOS WordPerfect 5.1, since the two programs use the same printer drivers. WordPerfect for Windows also uses PTR.EXE to modify its drivers. Note that PTR.EXE remains a DOS program in the WordPerfect for Windows package. □

TIPS FROM WORKING WORDSMITHS

Tell the Working Word your latest word processing discovery; we'll pay you \$50 for any tip we print. Please send your contribution on-disk along with a printout to The Working Word, *PC Magazine*, One Park Ave., New York, NY 10016, or upload it to PC MagNet (see page 12 for access instructions). We regret that we are unable to acknowledge submissions or answer questions individually.

WE ACCEPT PO'S
FROM QUALIFIED FIRMS

MEMORY

NO SURCHARGE
FOR MC, VISA & DISCOVER

★ ★ CALL TOLL-FREE 800-433-3726 ★ ★

★ 4MEG SALE ★

P/S2 — 4Meg Modules, 87F9977, 34F2933 **149.00**

Compaq — 4Meg Modules,
113132-001, 112534-001 **169.00**

Toshiba — 4Meg Modules, T2000SX, T1000LE,
T2000SXE, T2000SX **179.00**

4Meg Module — 1x36-80, 72 pin **149.00**

Zenith — 4Meg Module, ZA3800MK **149.00**

"We buy large volume of excess inventory."

Individual D-RAM Chips

MEMORY FOR IBM & APPLE

	60NS	70NS	80NS	100NS
1Meg x 1	4 75	4 20	3 95	3 75
1Meg x 4	—	—	19 00	—
1Meg x 4 (Zip Pack)	—	23 00	21 00	—
256 x 4 (Video Zip)	—	—	—	12 95
256 x 4	4 50	4 25	4 10	3 90
256 x 1	2 30	2 15	1 70	1 40
64 x 4	—	—	3 00	—
64 x 1	—	—	—	1 30

SIMM MODULES (Add \$5** for SIPP)

	40NS	53NS	60NS	70NS	80NS	100NS
1Meg x 9 (IBM)	75 00	45 00	38 00	36 00	34 00	32 00
4Meg x 9 (IBM)	CALL	CALL	139 00	124 00	119 00	—
256 x 9 (IBM)	—	—	19 00	18 00	16 00	15 00
256 x 36 1Meg (72 PIN)	—	—	—	—	50 00	—
512 x 36 2Meg (72 PIN)	—	—	—	—	85 00	—
1 x 36 4Meg (72 PIN)	—	—	169 00	—	149 00	—
2 x 36 8Meg (72 PIN)	—	—	329 00	—	309 00	—
4 x 36 16Meg (72 PIN)	—	—	599 00	—	549 00	—

INTEL Math Chips

8087	49 00	487-SX20	549 00
8087-2	69 00	80387-DX (Does All)	479 00
8087-1	89 00	Intel SX (Does All)	99 00
80287-XL	89 00	Intel SL Mobil	99 00
80387-16	79 00	Overdrive 486 20/16SX	519 00
80387-20	89 00	Overdrive 25 SX	639 00
		Rapid Cad	299 00

CYRIX FASMATH PROCESSOR

• Programs executed up to 3X faster • Plug & object code compat w/Intel
• PC Week • rated #1 over all math chips

5 Year "All Downward Compatible" Warranty

83D87-40MHz — 139 00
83D87-33MHz — 114 00
83S87-25SX Ver. — 99 00

AST MEMORY MODULES

MODEL#	AMT. UPGRADED	AST PART#	PRICE
Premium 386/25, 16 SX	1Meg	500718-001	55 00
Premium 386/33	1Meg	500718-002	56 00
Premium II	1Meg	500780-003 WPB	60 00
386SX20, 486-25, 25E, 33	4Meg	500780-004 WPB	149 00
Premium Tower, 386/33TE, 8Meg	8Meg	500780-001 WPB	298 00
486/25TE, 486/33TE			

ZENITH MEMORY UPGRADES

MODEL#	AMT. UPGRADED	ZENITH PART#	PRICE
Z386/33, 25, 20, 33E	1Meg	ZA3800ME	50 00
Z386/33, 25, 20, 33E	4Meg	ZA3800MK	159 00
Z248, Z286LP Z386SX	2Meg	Z-605-1 modules	99 00
Z486/33ET	4Meg	ZA-4200-M2	199 00
Z486/33ET	16Meg	ZA-4200-M8	639 00

MAGNAVOX

286/386SX-16, 386SX-20, 486SX-20 & 386-33
all are 72PIN SIMM — 1MEG — 50.00 4MEG — 149.00 8MEG — 309.00

IBM PS/2 SIMM MODULES

IBM PART NO.	WORKS WITH MODEL NO.	PRICE
30F5348 (512K)	30-286, 25-286, 50 MTHR 80	30 00
30F5360 (2Meg)	80-041	89 00
6450375 (1Meg)	80-111, 311-121, 321, 081, 161	65 00
6450379 (2Meg)	80-A21, A-61, 80-A31, 80-111, 80-311	109 00
6451060 (4Meg)	35SX, 40SX, 55SX, Model-70's, P-70	199 00
6450603 (1Meg)	70-061, E61, 121, 502, 55SX, 65SX, P-70	49 00
6450604 (2Meg)	55LS, 65LS, X-Station 120 & 130, 35SX, 35LS, 40SX	79 00
6450608 (2Meg)	70-A21, A-61, B-21, B-61, 35SX, 35LS, 40SX	84 00
78X8955 (128K)	25	35 00
34F2933 (4Meg)	35SX, 40SX, 55SX, 65SX, 55LS, 65LS	149 00
87F9977 (4Meg)	55SX, 55LS, 65SX, 40SX, 35SX, 35LS	149 00
1057035 (512K)	P/S1	40 00
92F9935 (2Meg)	P/S1 & P/S1/386SX	79 00
92F9694 (4Meg)	P/S1 & P/S1/386SX	149 00
6450902 (2Meg)	57SX, 90, 95, P-75, 57SLC	94 00
6450128 (4Meg)	57SX, 90, 95, P-75, 57SLC	149 00
6450129 (8Meg)	35SX, 40SX	319 00
6450130 (8Meg)	57SX, 90, 95, P-75, 57SLC	319 00
79F0999 (2Meg)	LX40, N33SX	99 00
79F1000 (4Meg)	LX40, N33SX	149 00
79F1001 (8Meg)	LX40, N33SX	299 00

COMPAQ MEMORY MODULES

MODEL#	AMT. UPGRADED	COMPQ PART#	PRICE
DeskPro 386/33, 386/33L	2Meg Module	115144-001	104 00
486/25, 486/33L	8Meg Module	116561-001	299 00
486/50L	32Meg Module	116568-001	1700 00
System Pro			
DeskPro 386/25, 386/20	1Meg Module	113131-001	65 00
	4Meg Module	113132-001	169 00
DeskPro 386S-16MHz	1Meg Exp Bd	113633-001	110 00
	4Meg Exp Bd	113634-001	219 00
	1Meg Module	113646-001	75 00
	4Meg Module	112534-001	169 00
DeskPro 386/20E	1Meg Exp Bd	113644-001	119 00
DeskPro 386/25E	4Meg Exp Bd	113645-001	219 00
	1Meg Module	113131-001	75 00
	4Meg Module	113132-001	169 00
DeskPro 286N, 386N	1Meg Module	110680-001	50 00
386SX/20, 386/25M	2Meg Module	118689-001	85 00
486/33M, 486S/25M	4Meg Module	118690-001	159 00
486S/16M			
DeskPro 386/16	1Meg Kit	108071-001	99 00
	4Meg Kit	108072-001	269 00
	1-2Meg Exp Bd	108069-001	249 00
	4-8Meg Exp Bd	108070-001	479 00
DeskPro 286	512K Kit	113012-001	79 00

MEMORY UPGRADES FOR COMPAQ PORTABLES & LAPTOPS

Portable 386	1Meg Kit	107651-001	129 00
	4Meg Exp Bd	107653-001	449 00
	4Meg Daght Bd	107654-001	449 00
Portable III	2Meg Kit	107332-001	99 00
Compaq SLT/286	1Meg Module	110235-001	99 00
	4Meg Module	110237-001	299 00
Compaq SLT/386	1Meg Module	118303-001	89 00
	2Meg Module	118304-001	129 00
	4Meg Module	118305-001	199 00
Compaq Lite 286	1Meg Bd	117081-001	79 00
	2Meg Bd	117081-002	99 00
	4Meg Bd	117081-003	219 00
Compaq Lite 386S/20	1Meg Module	121125-001	99 00
Compaq Lite 386S/20	4Meg Module	121125-002	219 00
Compaq Lite Lite/20, 25	2Meg Module	129769-001	159 00
Compaq Lite Lite/20, 25	4Meg Module	129769-002	249 00
Compaq Lite/Lite20, 25	8Meg Module	120769-003	499 00

NO SURCHARGE FOR MASTERCARD, VISA OR DISCOVER. PURCHASE ORDERS ACCEPTED FROM FORTUNE 500, GOVERNMENT & INSTITUTIONS. Price & availability subject to change. California orders add 8.25% sales tax. Returned orders or ordered wrong parts are subject to a 30% restocking fee. (Memory chips not installed in boards.) We accept international orders shipped via UPS Air, APO, FPO orders welcome. Customers are expected to pay customs and other charges if shipped int'l. All credit card charges verified for fraudulent use. SORRY, NO REFUNDS AFTER 30 DAYS — EXCHANGES ONLY. We accept MC, VISA, Discover, AE, prepaid orders, purchase orders, wire transfer, COD (cashiers check) orders, cash & cashiers checks. • ALL MANUFACTURER PART #'S ARE FOR REFERENCE ONLY •

TOSHIBA LAPTOP MEMORY

LAPTOP MODEL #	AMT. UPGRADED	TOSHIBA PART #	PRICE
T1000SE/XE/LE	2Meg	PC14-PA8312U	109 00
T2000/T2000SX	2Meg	PC18-PA8317U	109 00
T2000SX/T1000LE	4Meg	PC-PA8314U	179 00
T2000SX/T1000LE	8Meg	PC14-PA8315U	349 00
T2000SXE/2200SX	2Meg	PC-PA2000U	109 00
T2000SXE/2200SX	4Meg	PC-PA2001U	179 00
T2000SXE/2200SX	8Meg	PC-PA2002U	349 00
T4400SX, SXC T6400	2Meg	PC-PA2003U	159 00
T4400SX, SXC T6400	4Meg	PC-PA2004U	229 00
T4400SX, SXC T6400	8Meg	PC-PA2005U	470 00
T4400SX, SXC T6400	16Meg	PC-PA2010U	999 00
T3300SL	2Meg	PC-PA2006U	169 00
T3300SL	4Meg	PC-PA2007U	229 00
T3300SL	8Meg	PC-PA2008U	319 00
T1200XE	16Meg	PC-PA2009U	999 00
T1600	2Meg	PC13-PA8306	95 00
T3100	2Meg	PC8-PA8302U	95 00
T3100	2Meg	PC3-PA7135E	189 00
T3100	2Meg	PC9-PA8340U	95 00
T3100SX	2Meg	PC15-PA8308U	95 00
T3100SX	4Meg	PC15-PA8310U	159 00
T3200	3Meg	PC6-PA7137U	159 00
T3200SX	2Meg	PC12-PA8307U	94 00
T3200SX	4Meg	PC12-PA8909	159 00
T3200SXC	2Meg	PC19-PA8318U	99 00
T3200SXC	4Meg	PC19-PA8319U	159 00
T5100	2Meg	PC7-PA8301U	99 00
T5200/T8500	2Meg	PC10-PA8304U	99 00
T5200/T8500	8Meg	PC16-PA8313U	309 00

BRANDNAME LAPTOP MEMORY

Leading Edge D/LT 386SX	1Meg		119 00
Bondwell B310, Plus	1Meg	23050-09100	109 00
Bondwell B310V, SX	1Meg		109 00
NEC Prospeed 286, 386SX-16	1Meg	PC21 21	119 00
NEC Prospeed 286, 386SX-16	4Meg	PC21-22	209 00
NEC Prospeed 386	2Meg	PC31-21	159 00
NEC Prospeed 386	8Meg	PC31-22	579 00
NEC Prospeed 386SX-20	1Meg	PC43-21	139 00
NEC Prospeed 386SX-20	4Meg	PC43-22	409 00
Sharp PC-6220	1Meg	CE 6218	109 00
TI Travelmate 2000	1Meg	2568034-0001	109 00
TI Travelmate 3000	2Meg	2566996-1	89 00
Zeos 386SX Notebook	2Meg		99 00
Zenith Master Sport 386SX	2Meg	ZA-300-1	129 00
Zenith Master Sport SL, SLE	2Meg	ZA-4-4	119 00
Zenith Super Sport —			
286, 286E	1Meg	ZA-180-66	99 00
286E, SX	2Meg	ZA-180-64	139 00
SX Alpha	2Meg	ZA-180-86	139 00
SX Beta	2Meg	ZA-180-87	139 00
Everex Tempo LX, LX20	2Meg	PCA 00053-0001	99 00
Everex Tempo Corner	2Meg	PWA 0884-A-3000	129 00
AST Notebook Prem Exec	2Meg	500814-003, 386SX/20/25/25L	139 00
Sanyo 17118 NB	4Meg	MBC-NBMEM2	99 00
Panasonic CF170, CF270, CF370	1Meg	CF-BA165	59 00
Epson NB3	4Meg	A808511	179 00
Tandon	2Meg, 8Meg	NB386SX-20	89 00, 319 00
AT&T Safan NSX/20	2Meg, 4Meg	PEC37650, 37651	159 00, 299 00
Packard Bell 386SX	1Meg, 4Meg	286, 386SX	99 00, 219 00
Magnavox Metals	1Meg, 4Meg	286, 386SX	99 00, 219 00
Goldstar GS520 386SX/16	1Meg, 4Meg	S386-1M, S386-4M	99 00, 249 00
Librex 286	2Meg		179 00
N.P. ISLX Palmtop	128KB, 512KB, 1Meg, 2Meg	\$2.00, 149.00, 229.00, 429.00	

*** CALL FOR NEW UPGRADES Dell 325C, Zenith Z-Note, Compaq Contura, Sanyo NL, Everex 25L & TI Travelmate 4000 ***

LASER PRINTER MEMORY UPGRADES

HP 2.20.3.30.3P.2P.2P+	1MEG	2MEG	4MEG	IBM Laser 4029	1MEG	2MEG	4MEG
Panasonic 4410/4430	—	104	164	HP III SI	55	—	159
Panasonic 4420/4450	89	129	199	Panasonic 4455	—	119	—
Panasonic 4450	119	—	—	NEC 90, 290	—	119	—
Epson 6000, Action Lsr	—	115	179	NEC 95	—	139	—
Epson Action Laser II	CALL	CALL	CALL	QMS 410	119	159	249
Toshiba Page Laser 8	—	115	179	TI XL/PS17/PS35	55	—	—
Packard Bell PB9500	—	115	179	STAR L504	129	179	269
OKI 400	—	109	—	Starscript 4	129	179	269
IBM Laser 4019, 4019E	—	—	149	Deskjet 500, 500C (256K)	—	—	64 00
Canon LBP4	129	179	—	HP Design Jet Potter (4Meg)	—	—	179 00

H.P. COMPATIBLE FONT CARTRIDGE

DESKJET SOLUTION for DeskJet 500, DeskJet Plus, 92 fonts, 4.5 pt. to 30 pt. **119 00**
IBM 4019, 4019E, FONT CARTRIDGE 209 Fonts, Turbo Card **109 00**
TURBO 25 Comparable to Pacific Data's 25 CARTRIDGES
IN ONE!™ 150 Fonts (works with Epson Action Laser II) **89 00**
TURBOSCRIP™ 47 Scalable Fonts in Any Point Size **199 00**
TAX & FINANCE FOR IBM 4019, 4019E, 4029 **139 00**
TAX & FINANCE CARTRIDGE **99 00**
PRO-65 for Epson & Toshiba Laser Printers, 65 Fonts **129 00**

BOCA AT PLUS

16 BIT MEMORY BOARD FOR 286, 386 AT
OK-8Meg Board • 4.0 LIM Compatible • New 5 Year Warranty
Conventional, Expanded and Extended Memory
Supports DOS, OS/2, LIM/EMS & EEMS
Versatile Split Memory Addressing
Operates with CPU Speeds to 33 MHz
Supports Desqview, Multitask operations

OK — \$99.00 2Meg — \$169.00 4Meg — \$249.00 8Meg — \$379.00
Board made by Boca Research, AT plus

BOCA AT PLUS I/O 1 pak, 1 soc, 8-4 meg **124.00**

BOCA XT 8 BIT BUS

• Expanded memory for XT • Lim 4.0 compat 0-2Meg • Uses 256x1-100
O-K \$

CONNECTIVITY

Connecting Mainframes and LANs: Use your 3270 adapters and cable for LAN access **Creating Safer Networks:** Fiber-optic cable is best for linking buildings

BY FRANK J. DERFLER, JR.

Connecting Mainframes and LANs

Our organization isn't downsizing yet, but we are caught in a squeeze. We have many tried-and-true applications on our IBM host computer, but PC users also want to use printers and to get at files on our NetWare network. We have a big investment in DCA IRMA boards for 3270 terminal emulation in the PCs and in RG-62 cabling for the 3270 connections installed throughout the building.

I know we can install LAN adapters in each PC and run LAN cable while retaining the 3270 stuff, but there will be lots of installation problems and added cost. We could also throw out the 3270 equipment and use a Token-Ring connection to the mainframe, but that involves even more cost and disruption. Is there any way to use the existing 3270 adapters and cabling for LAN access as well as mainframe access?

*Bryan Duffy
Chicago, Illinois*

► **PC MAGAZINE** There are a couple of ways to approach this problem. First, you could use ARCnet adapters for the LAN. These adapters use the same RG-62 coax you've already installed for the 3270 connections, and you could install the ARCnet wiring hub near your existing IBM 3X74 controller. Then you would need a LAN gateway to link to the mainframe. This option costs roughly \$150 to \$200 per node for the adapter and hub plus several thousand dollars for the gateway. Unfortunately, you'd still have to remove the existing 3270 adapters and face potential installation problems with the ARCnet adapters.

Harris Adacom (214-386-2000) offers an appealing alternative for achieving

LAN and mainframe connectivity that eliminates the need to change anything in the PCs. CoaxNet is a 3270 coax bridge that links as many as 32 PCs into a NetWare LAN through their 3270 coax connections and emulation cards. The Ethernet version of CoaxNet sells for \$7,000; the Token-Ring version is \$8,000.

The package includes software for each client PC that redirects requests from applications and the command line out through the 3270 adapter. Each PC provides virtual-drive operation across the network while it retains full access to the 3270 mainframe computer system.

The coax bridge is about 7 inches high and it fits into a standard 19-inch equipment rack. You set it up near your 3X74 controller and provide it with a single Ethernet or Token-Ring attachment to the LAN.

When you find a reasonably priced way to give users simultaneous access to a LAN and a mainframe without changing the hardware in their PCs, they think you're a magician. Adaptive products like CoaxNet provide a desirable alternative to the unavoidable problems and downtime associated with major reconfiguration projects.

Creating Safer Networks

In your column of March 31, 1992, you discussed the term "properly grounded." Unfortunately, this issue is misunderstood by many people. Last year, one of my clients installed a LAN using coaxial cable running in a conduit between two buildings. During a thunderstorm, there was a direct lightning strike in the parking lot in front of one of the buildings. Apparently there was some potential between the grounds in the buildings, and the

lightning decided that the path through the cable, the adapters, and the frames of the networked PCs looked inviting. Lightning fried every LAN adapter in the network! Luckily, no one was hurt. You might want to recommend that this type of cabling be avoided.

*Ron Dombrowski
Torrington, Connecticut*

► **PC MAGAZINE** It just doesn't make economic or practical sense today to use anything but fiber-optic cable to link buildings. You can buy wiring hubs, repeaters, and bridges equipped with ports that meet the IEEE's Fiber Optic Inter Repeater Link (FOIRL) standard for fiber optic Ethernet. You can even purchase small external FOIRL transceivers that attach to the AUI port of practically any LAN adapter. Optical Data Systems (214-234-6400) offers a wide variety of fiber-optic products for Ethernet and Token Ring, and Codenoll Technology Corp. (914-965-6300) offers FOIRL LAN adapters. You don't need to pay the full cost for FDDI to enjoy the freedom from electrical and lightning hazards provided by fiber-optic cabling. □

NETWORK YOUR QUESTIONS

Connectivity gives you practical solutions to networking problems of all types. We'll pay \$50 for any tip we print. Please submit your letter on-disk along with a printout. Then mail your contribution to Connectivity, *PC Magazine*, One Park Ave., New York, NY 10016. You may contact Frank J. Derfler, Jr., via MCI Mail (MCI ID: 240-2931) or the LAN Labs fax machine (904-267-1578).

COMPUCLASSICS

Compuclassics Cares

YOUR SOURCE FOR SOFTWARE

GUARANTEED 48-HOUR DELIVERY FOR \$7**
OR WE'LL SHIP IT FOR FREE.

- Over 10,000 Titles Available
- Corporate PO's Welcome
- No Minimum on Individual Orders
- International APO & FPO Account Orders Accepted
- Gov't, Educational PO's Welcome
- No Credit Card Surcharge for U.S. Orders
- Most Personal Checks Will Clear Immediately

* ON ORDERS PLACED BY 3PM PST. EXCLUDING WEEKENDS



For every copy of **Systems Compatibility Corporation's Outside In for Windows** we sell this month, we will donate \$5.00 towards planting and preserving trees in the Amazon Rain Forest.

\$65

ACCOUNTING		PC File 6.5		PDA/Handheld		MS Visual Basic		Accord w/Financial Planner		How	
Das Easy Accounting 4.2	92	Praxim 4.0	498	ATI Graphics Ultra 1MB	509	MS Windows SDK 3.1	245	De Time For Windows	75	PC Kwik Powerpak 2.1	85
Managing Your Money 8.0	65	O & A 4.0	259	ATI Graphics Ultra 1MB	509	Realizer	305	PC Tools Deluxe 7.1	119	PC Tools Deluxe 7.1	119
Payroll 2000 2.0	30	R & R Relational Report Writer 4.0	175	ATI Graphics Ultra 1MB w/Vecolor	299	Smalltalk Windows	300	Project Manager	459	Power Menu Plus 6.0	81
Quickbooks	89	Uzydes For Windows	259	ATI Graphics Ultra 1MB w/Vecolor	299	Toolbook 1.5	299	Project Scheduler V	459	Print 0.5.0	81
QuickDOS/Windows 5.0	44	DB Fast/Windows 1.7	339	ATI Graphics Ultra 1MB w/Vecolor	299	Win ++	145	Timeline DOS/Win 5.0 each	489	Projector 3.0	95
MYOB Accounting for Windows	135	Desktop Publishing		ATI Graphics Ultra 1MB w/Vecolor	299	Windows Master Pro	895	MS Project for Windows 3.0	465	QDOS II	45
Pachtree Accounting for Windows	79	Desktop Publishing		ATI Graphics Ultra 1MB w/Vecolor	299					QDOS III	45
CAD		Desktop Publishing		GRAPHICS		MULTIMEDIA/CD ROM		SPREADSHEETS		QEMM 386 6.02	
Autocad Simulator	155	Desktop Publishing		ATI Graphics Ultra 1MB	509	Graker's View Electronic Encyclopedia	229	Baker 6.0	359	Spam 2.0	62
Design Cad 2.0 5.0	179	Desktop Publishing		ATI Graphics Ultra 1MB	509	Media Vision Pro Audio Spectrum 10	229	Baker XE 2.0	459	Stachar Data Compression (16 Bit)	189
Design Cad 3D 4.0	250	Desktop Publishing		ATI Graphics Ultra 1MB	509	Media Vision Pro Audio Spectrum 10	229	Lotus 1-2-3 4.0	339	Stachar Data Compression (Software Only)	89
Genetic Cadd 6.0	289	Desktop Publishing		ATI Graphics Ultra 1MB	509	Media Vision Pro Audio Spectrum 10	229	Lotus 1-2-3 3.1+	399	Superstar	82
AutoSketch 4.0/W 3.0	149/186	Desktop Publishing		ATI Graphics Ultra 1MB	509	Media Vision Pro Audio Spectrum 10	229	Lotus 1-2-3 Version Upgrade 3.1+	105	System Sketch Pro 4.0	80
DeltaCAD for Windows 2.0	429	Desktop Publishing		ATI Graphics Ultra 1MB	509	Media Vision Pro Audio Spectrum 10	229	Lotus 1-2-3 for the Home	105	Xtreme Gold 2.5	90
COMMUNICATIONS				ATI Graphics Ultra 1MB	509	Media Vision Pro Audio Spectrum 10	229	Quattro Pro 4.0	309	Fastback Plus D/W	115/122
Best Professional	87	ATI Graphics Ultra 1MB	509	ATI Graphics Ultra 1MB	509	Media Vision Pro Audio Spectrum 10	229	Quattro Pro Comp Upgrade 4.0	87	Norton Antivirus for D/W 2.0	89
Carbon Copy Plus 6.0	119	ATI Graphics Ultra 1MB	509	ATI Graphics Ultra 1MB	509	Media Vision Pro Audio Spectrum 10	229	SuperCalc 5.1	129	Norton Backup for D/W 2.0	80
DOS FaxPro 2.0	49	ATI Graphics Ultra 1MB	509	ATI Graphics Ultra 1MB	509	Media Vision Pro Audio Spectrum 10	229	Lotus 1-2-3 Win Fax/Upd 1.1389/104	94	Alamark for Windows 2.0	30
Hayes Print Modem 2400 w/Smartmod	12	ATI Graphics Ultra 1MB	509	ATI Graphics Ultra 1MB	509	Media Vision Pro Audio Spectrum 10	229	MS Excel for Windows 4.0	309	Norton Desktop for Windows	119
Intel Smartmodem 100	112	ATI Graphics Ultra 1MB	509	ATI Graphics Ultra 1MB	509	Media Vision Pro Audio Spectrum 10	229	MS Excel for Windows Upgrade 4.0	127	Wordwatch Professional 2.0	89
Intel Smartmodem 400	439	ATI Graphics Ultra 1MB	509	ATI Graphics Ultra 1MB	509	Media Vision Pro Audio Spectrum 10	229			WORD PROCESSING	
Loglink Pro 4.0	105	ATI Graphics Ultra 1MB	509	ATI Graphics Ultra 1MB	509	Media Vision Pro Audio Spectrum 10	229			Fonts On The Fly 2.0	85
Mirror III 2.2	86	ATI Graphics Ultra 1MB	509	ATI Graphics Ultra 1MB	509	Media Vision Pro Audio Spectrum 10	229			MS Word 5.5	219
PC Anywhere (Host & Remote) 4.5	119	ATI Graphics Ultra 1MB	509	ATI Graphics Ultra 1MB	509	Media Vision Pro Audio Spectrum 10	229			Screen Capture WindowPerfect 2.0	85
ProComm Plus 2.0	74	ATI Graphics Ultra 1MB	509	ATI Graphics Ultra 1MB	509	Media Vision Pro Audio Spectrum 10	229			Wordperfect 5.1	272
Quicktel Int. 9624 S/R Fax/Modem	89	ATI Graphics Ultra 1MB	509	ATI Graphics Ultra 1MB	509	Media Vision Pro Audio Spectrum 10	229			Wordmark V DOS/Win-Ea	60
Reflection 4 Plus 4.1	289	ATI Graphics Ultra 1MB	509	ATI Graphics Ultra 1MB	509	Media Vision Pro Audio Spectrum 10	229			Highwater for DOS/Win-Ea 6.0 5.5	55
Telnet Office	289	ATI Graphics Ultra 1MB	509	ATI Graphics Ultra 1MB	509	Media Vision Pro Audio Spectrum 10	229			AMI Pro Comprehensive Upgrade 3.0	105
Wordport 2496 Fax/Modem V 42	269	ATI Graphics Ultra 1MB	509	ATI Graphics Ultra 1MB	509	Media Vision Pro Audio Spectrum 10	229			MS Word for Windows 2.0	300
Wordport 9696 Fax/Modem V 32	319	ATI Graphics Ultra 1MB	509	ATI Graphics Ultra 1MB	509	Media Vision Pro Audio Spectrum 10	229			MS Word for Windows Upgrade 2.0	127
Zoom 9624 S/R Fax Modem Int.	115	ATI Graphics Ultra 1MB	509	ATI Graphics Ultra 1MB	509	Media Vision Pro Audio Spectrum 10	229			Wordperfect for Windows	272
Zoom 9624 S/R Fax Modem Ext.	125	ATI Graphics Ultra 1MB	509	ATI Graphics Ultra 1MB	509	Media Vision Pro Audio Spectrum 10	229			Wordperfect 5.1 To Windows Upgr	85
DATABASES				ATI Graphics Ultra 1MB	509	Media Vision Pro Audio Spectrum 10	229			XENIX/UNIX	
CC Mail MS DOS/Win	218/368	ATI Graphics Ultra 1MB	509	ATI Graphics Ultra 1MB	509	Media Vision Pro Audio Spectrum 10	229			SCO Unix Oper Syst 386 (M/I) 3.2	829
Carbon Copy Plus D/W-Ea 6.0	119	ATI Graphics Ultra 1MB	509	ATI Graphics Ultra 1MB	509	Media Vision Pro Audio Spectrum 10	229			SCO VP/IX 386 Unimail 1.2	714
Chase Up Support/Cont D/W 4.0	129	ATI Graphics Ultra 1MB	509	ATI Graphics Ultra 1MB	509	Media Vision Pro Audio Spectrum 10	229			Xerox For Unix	139
Chase Up Support (2 User)	105	ATI Graphics Ultra 1MB	509	ATI Graphics Ultra 1MB	509	Media Vision Pro Audio Spectrum 10	229			HARDWARE	
Crosslink for Windows 1.2	119	ATI Graphics Ultra 1MB	509	ATI Graphics Ultra 1MB	509	Media Vision Pro Audio Spectrum 10	229			Bendul Transposable 30MB Drives	849
Procomm Plus for Windows	89	ATI Graphics Ultra 1MB	509	ATI Graphics Ultra 1MB	509	Media Vision Pro Audio Spectrum 10	229			Colorado DJ-20	279
Reflection 2 Windows	239	ATI Graphics Ultra 1MB	509	ATI Graphics Ultra 1MB	509	Media Vision Pro Audio Spectrum 10	229			Hayes Optima 96 Smartmodem	399
Winfax Pro	75	ATI Graphics Ultra 1MB	509	ATI Graphics Ultra 1MB	509	Media Vision Pro Audio Spectrum 10	229			Intel 80387 DX Co-processor	89
FORMS/FLOWCHARTING				ATI Graphics Ultra 1MB	509	Media Vision Pro Audio Spectrum 10	229			Image Tape 250	679
Alpha/For Comprehensive Upgrade 2.0	95	ATI Graphics Ultra 1MB	509	ATI Graphics Ultra 1MB	509	Media Vision Pro Audio Spectrum 10	229			Logitech Flatman	249
Art Tanager Zip ++ 2.13	175	ATI Graphics Ultra 1MB	509	ATI Graphics Ultra 1MB	509	Media Vision Pro Audio Spectrum 10	229			Logitech Mouseman Serial/Bus	75
Blimber 2.0	259	ATI Graphics Ultra 1MB	509	ATI Graphics Ultra 1MB	509	Media Vision Pro Audio Spectrum 10	229			MS Ballpoint Mouse	129
Chopper 5.01	499	ATI Graphics Ultra 1MB	509	ATI Graphics Ultra 1MB	509	Media Vision Pro Audio Spectrum 10	229			MS Serial Mouse	89
Codebase 4.5	249	ATI Graphics Ultra 1MB	509	ATI Graphics Ultra 1MB	509	Media Vision Pro Audio Spectrum 10	229			32-bit Mouse w/ZMB for HP/IBM	149
Diase IV 1.5	499	ATI Graphics Ultra 1MB	509	ATI Graphics Ultra 1MB	509	Media Vision Pro Audio Spectrum 10	229			Pacific Page PE	299
Diase IV Version Upgrade to V. 1.5	95	ATI Graphics Ultra 1MB	509	ATI Graphics Ultra 1MB	509	Media Vision Pro Audio Spectrum 10	229			Plus Harddisk 100 105MB	459
dGE 4.1	229	ATI Graphics Ultra 1MB	509	ATI Graphics Ultra 1MB	509	Media Vision Pro Audio Spectrum 10	229			Quicktel Int 2400 Modem w/MNP 5	119
Fogon LAN 6 Pack 2.0	499	ATI Graphics Ultra 1MB	509	ATI Graphics Ultra 1MB	509	Media Vision Pro Audio Spectrum 10	229			25 m Drive Form Cartridge V III	142
Fogon Single User 2.0	479	ATI Graphics Ultra 1MB	509	ATI Graphics Ultra 1MB	509	Media Vision Pro Audio Spectrum 10	229				
Funcity Lite 1.5	189	ATI Graphics Ultra 1MB	509	ATI Graphics Ultra 1MB	509	Media Vision Pro Audio Spectrum 10	229				

Salvation
The Ultimate Windows Desktop File Manager-Simple, Fast, and Powerful! "Salvation" Shields Windows with Grace!—Computer Shopper A must utility for any Windows user.

\$39

After Dark
After Dark 2.0 Save your screen with over 40 incredible displays—5 Brand New Displays, Digitar Sound, True Color Graphics, WinZipper, Network Password Support and MultiModule Also DOS blanking to black password protection!

\$30

Hayes Optima Modems

Affordable data + Group 3 FAX modems. OPTIMA 144 + FAX 144 supports V.32bis/14,400 bps data and 14,400 bps FAX. Use OPTIMA 96 + FAX96 for V.32/9600 bps data and 9600 bps FAX. OPTIMA 24 + FAX96 is ideal for local data/FAX transfers. V.42/V.42bis and MNP5 error-control and data compression.

144+FAX144 96+FAX96 24+FAX96

\$529 \$415 \$165

COMPUCLASSICS

CALL US FOR PRODUCTS NOT LISTED
PLEASE SPECIFY DISK SIZE WHEN ORDERING

**Shipping charges \$7.00 per order, up to 7 lbs. \$1.00 per pound above 7 lbs. only in the Continental United States. Defective software will be replaced immediately. Your credit card will not be charged until your order is shipped. Delivery guarantee only applies to in-stock items. Alaska, Hawaii, Puerto Rico, Int'l, FPO/APO call for shipping charges. 15% restocking fee on non-defective items. Prices subject to change without notice. We ship latest versions. We accept VISA, MasterCard, Discover, JCB and American Express. Please call (818) 347-9400 for an authorization number on returns. \$5.00 C.O.D. charge. Order disk open 7 am to 5 pm Monday through Friday (PST), Saturday 10 am to 2 pm. 24-Hour FAX Order-Line.

Indicates Windows Products
Indicates DOS/Windows Products

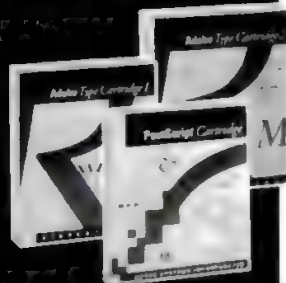
PGM 9/92

800-735-1993/818-347-7500/FAX 818-347-9977

CIRCLE 205 ON READER SERVICE CARD

ADD POWER TO YOUR LASERJET II™

FOR ONLY
\$228⁷¹



Order Adobe's PostScript Cartridge Today and Get Type 1 or 2 and ATM** for FREE
** (Total of up to 53 typefaces)
Extra Bonus:
2MB of Memory for only \$99
(*HP LJ II Only)

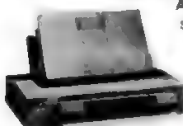
HIGH RESOLUTION PRINTING

LaserMaster WinJet 800 and WinPrinter 800 both specifically designed to print high resolution (800dpi) Postscript in Windows 3.X. An exceptionally fast solution for all high resolution needs
WinJet800 - LJII/IIID/IIID only..... \$885
WinPrinter 800..... \$1,495
■ Blinding Print Speeds
■ High-Resolution Postscript Output



INKJET/PLOTTER

Pacific Data's ProTracer Ink Jet Printers generate impressive A, B and C size output



Call for
Lowest
Price

MEMORY UPGRADES

Available for most Laser Printers!
Every board pre-tested with lifetime warranty



FONT CARTRIDGES/SOFTONTS

Pacific Data
25 in One Lowest Price
Complete Font Library (PCL5) \$259
IQ Engineering
SC2/SC3 (PCL5) CALL
UDP
Turbo 25 \$140
Misc. Fonts, Custom Font Cartridges
Adobe Fonts Collection - Complete
library available CALL

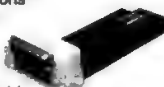
POSTSCRIPT ENHANCEMENTS

LJII only
Adobe PostScript Cartridge-See Special Pacific Page II and II/XL (New) CALL
LJII/II/IIIP
Pacific Page P.E. \$287
P.E. for Macintosh \$459
P.E. XL High Speed with 2MB CALL
UDP TurboScript Cartridge \$229

PRINTER SHARING DEVICES

Wide array of solutions available for printer sharing needs.

Laserplex
256K memory standard, upgradable to 1.25MB, serial up to 115 Kbaud
Model 50 - 4 serial, 1 par. \$285
Model 80 - 8 serial \$368
ASP ST 1200 -
12 serial up to 4MB from \$689
Logical Connection from \$239
Buffalo Box -
8 in/2 out par / ser., 1 par. CALL



MISC HARDWARE & SOFTWARE

Lower Cassette for IIP/IIIP \$137
Paper Trays for LJ2/3 & all SX Engines
Letter/Legal Tray \$59
Envelope Tray \$72
Large Capacity Feeders
1500 Sheet Feeder \$489
250 Envelope Feeder CALL
JetFax - Stand Alone Plain Paper Fax (1MB) The best in it's category!
JetFax 2 - (1MB-4MB) from \$645
ASAP Fax- Send/receive (1.2MB) .. \$419
ASAP - Automatic, Phone/Fax/Modem
Switch *(PC Mag. Editors Choice)
TF333/TF555* \$110/139

Laser Printer Enhancements Is Our Specialty!

CALL THE LASER PRINTER
ENHANCEMENT SPECIALIST

1-800-747-HPLJ

(1-800-747-4755)
Call for your FREE Product Guide
DH Systems, Inc.
1940 Cotner Avenue
Los Angeles, CA 90025
(310) 479-4477 FAX (310) 478-4770



• OVER 20,000
SATISFIED
CUSTOMERS
• FULL TECHNICAL
SUPPORT

We Know What We Sell!

**LOWEST PRICE
GUARANTEED**

NO SURCHARGE FOR CREDIT CARDS
IMMEDIATE SHIPMENT ON APPROVED
PURCHASE ORDERS - 30 DAY MONEY
BACK GUARANTEE. Except for opened software. Does not
include return freight or shipping or handling. All returned
merchandise must be accompanied by a return material
authorization (RMA) number. Prices are subject to change
without notice. VISA/MASTERCARD ACCEPTED



CIRCLE 125 ON READER SERVICE CARD

How a New Concept in Retailing Was Introduced in a Big Way.



When Gordon Hoffstein and his partners founded PCs Compleat in January 1992 they wanted to combine the best of two worlds.

"We offer a broad selection of leading national brands and all the advantages of buying from a first-rate direct marketer.

"For example, when a buyer calls us about laptops, we can offer him thirty different choices. And he can discuss the standard and optional features offered by each manufacturer with a technically sophisticated salesperson who has all the facts. We do custom configurations and load applications and systems software. We ship the product out the same day, and we provide toll-free, lifetime technical support.

"One of my first marketing decisions was to put a spread ad in every issue of PC Magazine, using the PC Direct section. It's turned out to be our best lead generator by far.

"Because PC Magazine readers know about the products and features they want, they're ready to buy on the first call.

"PC Magazine brings us the kind of customers we want, those who know that value means more than just a low price."

If you're a direct marketer with a breakthrough idea, bring it to the attention of over 900,000 of the most active and knowledgeable PC buyers. Call your PC Magazine sales representative or 212-503-5100 for the facts about PC Direct.



The Purchasing
Source for
Direct Buyers

telemart

OVER A DECADE OF EXPERIENCE

WINDOWS

ACCPAC Simply Accounting.....	\$117	MS Money for Windows.....	\$42
Adobe Illustrator 4.0 for Windows.....	355	MS Office for Windows.....	445
Adobe Streamline Windows.....	120	MS PowerPoint for Windows.....	293
Adobe Type Manager Windows.....	50	MS Productivity Pack.....	36
After Dark 2.0.....	27	MS Project for Windows.....	412
Ami Pro 2.0.....	275	MS Publisher for Windows.....	118
AutoSketch Windows.....	189	MS Word for Windows.....	293
Borland C++ 3.1.....	339	MS Works for Windows.....	118
Carbon Copy for Windows.....	129	Norton Backup.....	95
Corel Draw 3.0.....	387	Norton Desktop for Windows.....	93
Cresstalk for Windows.....	115	Objectvision for Windows.....	94
dBFast for Windows.....	325	Omni Page 386.....	436
Designer for Windows.....	369	On Time for Windows.....	70
Drafix Cadd Windows.....	410	PC-Kwik Power Pak.....	89
Fast Fonts Windows.....	60	Packrat 4.0 for Windows.....	235
Facelift for Windows.....	59	PageMaker 4.0 for Windows.....	499
Formbase for Windows.....	295	PageFORM Pro.....	178
Grammatik V Windows.....	55	PS Professional Write Plus.....	156
Harvard Graphics for Windows.....	358	RightWriter for Windows.....	53
hDC File Apps.....	70	Superbase 4 for Windows.....	451
hDC FirstApps for Windows.....	53	TakeNote for Windows.....	36
hDC ICON Designer.....	32	Toolbook.....	280
hDC Windows Express.....	53	Turbo C++ Windows.....	102
IBM Current for Windows.....	213	Ventura Publisher Gold/Windows.....	499
Icon Do It for Windows.....	19	WinConnect.....	59
Laos 1-2-3 for Windows.....	329	WINFAX Pro.....	70
MathType Windows.....	159	Winspeed.....	55
MS Entertainment I, II, III.....	25	Wintools.....	115
MS Excel for Windows.....	293	WordPerfect for Windows.....	259
		Wordscan + 286/386 2Mb OCR.....	411

OFFICE ON THE GO

LAPTOP		NOTEBOOK	
Appoint.....		AST Exec 386SX-20 40Mb.....	\$1700
Thumbelina Portable.....	\$59	Everex Tempo 386SX-20 1/60Mb.....	1400
Battery Watch Pro.....	29	Leading Edge 386SL25 2/60 Mb Cir.....	219
Brooklyn Bridge w/Par & Ser Cable.....	85	Librex 386SX 20 4/40 Mb.....	1499
Laplink Pro.....	51	Librex 386SX-20 4/60 Mb.....	1899
Logitech Mouseman Serial Cordless.....	82	NoteStar.....	
Microsoft BallPoint Mouse.....	110	386SX-16 2/40 Mb Notebook.....	1313
MicroSpeed MicroTrac.....	54	386SX-16 2/60 Mb Notebook.....	1330
Software Bridge 5.1.....	70	386SX-20 2/40 Mb Notebook.....	1373
VGA Dimmer.....	23	Panasonic All Models.....	Call
Winconnect.....	59	Texas Instruments.....	
Toshiba.....		3000 60Mb.....	2481
T2200SX 80Mb.....	2100	3000 WIN/SX 60Mb.....	1900
T3300SL 80 Mb.....	2900	4000/16 WIN/SX 80Mb.....	2300
T3300SL 120 Mb.....	3300	Other Models.....	Call
T4400SX 80 Mb.....	4480	PALMTOP	
T4400SX 120 Mb.....	4700	Poqet Hand Held.....	\$559
T4400SXC 120 Mb.....	6130		

CD ROM/MULTIMEDIA

HARDWARE		SMART & FRIENDLY	
NEC.....		CD ROM Bundle.....	
CD ROM EXT CDR-74.....	\$569	Sony CD-535 Drive, Interface, Cable.....	
CD ROM INT CDR-84.....	509	Disk Caddy & Audio Play Software.....	
CD-GLRX-CD-74.....	699	*Special Software Bundle Prices.....	
COREL Blockbuster Bundle Int.....	915	Internal.....	\$343
Panasonic Worm 940 MB.....	2899	External.....	394
Sony.....		HS1200 Internal.....	489
CDU 535.....	299		
CDU 541.....	418	Classic Collection +.....	34
CDU 7211.....	526	Toolworks Bundle +.....	73
CDU 7205.....	459	Family Doctor.....	41
SOUND CARDS		Kings Quest V.....	41
Brown-Wagh.....		Library of the Future.....	133
Sound Blaster.....	\$91	Mixed up Me Gossa.....	35
Sound Blaster Pro.....	189	Net Geographic.....	40
Sound Blaster Pro Basic.....	151	PC SIG Library.....	182
SoundBlaster Video Blaster.....	339	Stellar 7.....	41
MediaVision Pro Audio Spectrum +.....	181	Wing Commander.....	41
SOFTWARE		Zip Plus +.....	110
Adas Pak.....	\$63	Other Titles.....	Call
Mammals.....	87		
NEC Type Gallery PS.....	235		

SPECIAL!
2,950 Programs + 2 Disk Set \$49

NETWORKING & LAN

SOFTWARE		HARDWARE	
ACCPAC BPI LAN.....	\$230	Engle.....	
Dac Easy Network Acct System.....	180	NEC Netw LT Combo Add on (3.5).....	\$259
Data Ease Server Access 3-Pak.....	511	Netw are LT Combo Add on (3.5).....	204
Direct Access Network Unlimited.....	365	Netw are LT Combo Add on (5.25).....	204
FoxPro Dist Kit.....	289	Netw LT Cmbd NE/2000 Str (5.25).....	400
FoxPro Lan 2.0 - 6 Pak.....	515	Arsoft.....	
Lotus 123 3.1+ Network.....	818	Lantastic 2MBPS Starter.....	331
MS Excel 4.0 License Pack.....	224	Lantastic Ethernet Starter.....	480
Netroom Single (dual).....	59	Others.....	Call
Norton PC Anywhere LAN.....	318	Standard Microsystems.....	
Novell NetWare Lite.....	65	Ethercard Plus 8 bit Etk.....	118
Novell NetWare 386 Prem 10 Pk.....	1627	All Other Models.....	Call
Peachtree Network.....	495	Tiera.....	
Print Q LAN (4 User).....	269	All Other Models.....	Call
Procom + LAN - 5 Pak.....	319		
Q & A Network Pack.....	320		
Quattro Pro Lan.....	295		

CAD & ENGINEERING

Auto Sketch 3.0.....	\$140	Summasketch 12x18 Pro II.....	
Design CAD 3.0.....	237	4 or 16 Button.....	\$39
Generic CAD 8.0.....	281	Turbo Cad.....	75
Generic CAD Starter Kit Level II.....	85	CalComp.....	
Math CAD (DOS).....	298	33120-34 Dig12x12 169.....	265
Summasketch 12x12 II 4 or 16 Butn.....	315	33120-34 Dig12x12 48.....	265



MIT SYSTEMS
386-40/128C
4Mb, 130Mb HD, SVGA, 28 (N)
System has Nationwide On-Site Service, AMI BIOS, DOS 5.0, 1.2 and 1.44 Mb Drives, Focus 2001 KB, V/O, VGA Hi-Color and "DOS the Easy Way!" Manual

\$1,519

OCR/SCANNERS

HARDWARE	
Complete.....	
Full Page 6S/w Wordscan.....	\$846
Half Page 400 DPI.....	105
DR	
Scanner HS-3000/4000PI.....	132
Logitech	
Logi Scanman 256 for PS/2.....	291
Logi Scanman 256.....	280

SOFTWARE	
Catch Word for OCR.....	\$132
CAT Reader Pro 1/2 Page.....	158
OmniPage 386 Windows.....	436
OmniProfessional 2.0.....	629

TERMINALS

Wyse.....	
30+.....	\$281
88.....	280
150.....	272
160.....	337
185.....	353



WINFAX PRO
Now it's easy as clicking the mouse to send faxes directly from your PC with WINFAX PRO! WINFAX PRO is a Windows 3 utility that installs like a printer driver, so you can work in ANY windows application.

\$70

DISKETTES

Sony.....	
3.5 D/S D/D (100).....	\$70
3.5 H/D (100).....	115
5.25 D/S D/D Disks (100).....	45
5.25 High Density (100).....	71

CO-PROCESSORS

Cyrax	
80387-SX 20.....	\$86
80387-DX 25.....	84
80387-SX 25.....	68
80387-DX 33.....	84
80387-SX-16.....	60
Intel	
80387-DX 33.....	83
80387-SX 16/20.....	97
Others.....	Call

PCM92952

KEYBOARDS

Keytronics KB101Plus..... \$35

TAPE BACKUP

Colorado Memory System.....	
Jumbo 250 INT.....	\$255
Jumbo 120 INT.....	199
Everex/Gig1568 TapeBackup.....	1079

POINTING DEVICES

Logitech Mouseman Serial/PS2.....	\$65
Logitech Trackman Portable.....	33
MS Ballpoint Mouse.....	126
MS Bus or Serial w/Windows 3.1.....	142
Microspeed PC Trac Ser or PS/2.....	70



WINSLEUTH PROFESSIONAL 2.0
Systems Analysis/Diagnostic for Windows 3.x. Hardware/Software configuration under Windows, tests hard disk, serial ports, video & mouse. Installation Assistant helps install new add-in boards. Included FREE: Co-Session - (\$179 value).

\$89

BOARDS

ATI.....	
VGA Wonder XL 256K.....	\$153
VGA Wonder XL 512K.....	129
Diamond	
Speed Star 24.....	189
SpeedStar 24K.....	179
SpeedStar 16Mb w/HI-Color.....	241
Everex	
RAM 3000 Deluxe.....	79
RAM 8000.....	167
Hercules	
Graphics Station 1Mb.....	467
Other Models.....	Call
Intel All Models	
Call.....	
Orchid	
Tiny Turbo 206.....	114
Tiny Turbo 306.....	177
Other Models.....	Call
Paradise	
Accelerator Card for Windows.....	162
VGA - 256K.....	103
VGA 1024 512K.....	187
Video 7	
1024 1w512K.....	91
Other Models.....	Call

HARD CARDS

Plus Development.....	
II XL50 MB.....	\$215
II XL105 MB.....	375
Other Models.....	Call



COMPUTER ASSOCIATES - TEXTOR

CA-Textor offers an easy-to-use, feature-rich user interface that incorporates select features, such as pull-down menus, pop-up dialogs and a user-configurable tool bar, which gives you simple and direct access to the many powerful features of CA-Textor

\$99

WHY HDI?

Five of the best reasons to buy HDI!

1 SATISFACTION GUARANTEED!

You receive with every purchase a 30-Day "Worry-Free" Guarantee and a 1-Year Replacement Policy FREE OF CHARGE. If you're not happy, we're not happy!

2 VALUE

You can save money with our volume buying. We pass our discounts on to you, and you get more megabytes for your buck!

3 PERFORMANCE

Our research and development teams provide you with the best hard drive/controller combination to suit your needs. Each solution is tested for performance and reliability.

4 EASY TO ORDER!

Call us toll-free at your convenience. We're open seven days a week, and accept all major credit cards. Our hours are: 6a-8p M-F, 7a-5p Sat., & 8a-4p Sun. (PST)

5 SERVICE

You get toll-free technical support with expert advice & FAST convenient Federal Express Delivery. 90% OF ORDERS ARE SHIPPED THE SAME DAY!

Insight

HARD DRIVES AND PERIPHERALS

NEW LOWER PRICES

PC MAGAZINE EDITORS' CHOICE

ORDER 24 HOURS EVERY DAY

Seagate

42MB ST351A (IDE)	
28ms 3.5" 1"H	
Bare Drive Kit	\$189
8 Bit Kit	\$219
16 Bit Kit	\$199
60MB ST277R-1 (RLL)	
28ms 5.25" HH	
Bare Drive Kit	\$219
8 Bit Kit	\$279
16 Bit Kit	\$299

106MB ST3120A (IDE)	
18ms 3.5" 1"H	
Bare Drive Kit	\$299
8 Bit Kit	\$339
16 Bit Kit	\$319

130MB ST3144A (IDE)	
16ms 3.5" 1"H	
Bare Drive Kit	\$349
8 Bit Kit	\$389
16 Bit Kit	\$369

245MB ST3283A (IDE)	
12ms 3.5" HH	
Bare Drive Kit	\$599
16 Bit Kit	\$619

1000MB ST41200N (SCSI)	
15ms 5.25" FH	
Bare Drive Kit	\$1999
16 Bit Kit	\$2149



Quantum

52MB QULPS52A (IDE)	
12ms 3.5" HH	
Bare Drive Kit	\$209
8 Bit Kit	\$249
16 Bit Kit	\$229

120MB QULPS120A (IDE)	
15ms 3.5" 1"H	
Bare Drive Kit	\$359
8 Bit Kit	\$399
16 Bit Kit	\$379

240MB QULPS240A (IDE)	
16ms 3.5" 1"H	
Bare Drive Kit	\$649
8 Bit Kit	\$689
16 Bit Kit	\$669

CONNER

40MB CP3000 (IDE)	
25ms 3.5" 1"H	
Bare Drive Kit	\$189
8 Bit Kit	\$229
16 Bit Kit	\$209

120MB CP30104 (IDE)	
17ms 3.5" 1"H	
Bare Drive Kit	\$349
16 Bit Kit	\$369

170MB CP30174A (IDE)	
17ms 3.5" 1"H	
Bare Drive Kit	\$399
16 Bit Kit	\$419

209MB CP3204 (IDE)	
16ms 3.5" HH	
Bare Drive Kit	\$609
16 Bit Kit	\$629

Talon

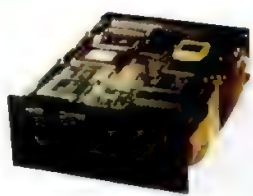
120MB TA3020A (IDE)	
15ms 3.5" 1"H	
Bare Drive Kit	\$299
8 Bit Kit	\$329
16 Bit Kit	\$319

FUJITSU

520MB FJ2624S (SCSI)	
12ms 3.5" 1"H	
Bare Drive Kit	\$1149
16 Bit Kit	\$1299

510MB FJ2624A (IDE)	
12ms 3.5" HH	
Bare Drive Kit	\$1149
16 Bit Kit	\$1169

1079MB (SCSI)	
14.5ms	
Bare Drive Kit	\$1819
16 Bit Kit	\$1969



MICROPOLIS

340MB MC1684-7 (SCSI)	
15ms 5.25" HH	
Bare Drive Kit	\$1099
16 Bit Kit	\$1249

1049MB HS MC1598 (SCSI)	
14ms 5.25" FH	
Bare Drive Kit	\$1949
16 Bit Kit	\$2099

660MB MC1624 (SCSI)	
15ms 5.25" HH	
Bare Drive Kit	\$1399
16 Bit Kit	\$1549

1354MB HS MC1528-15 (SCSI)	
14ms 5.25" FH	
Bare Drive Kit	\$2179
16 Bit Kit	\$2329

Maxtor

120MB MX7120A (IDE)	
15ms 3.5" 1"H	
Bare Drive Kit	\$349
16 Bit Kit	\$369

210MB MX7213A (IDE)	
15ms 3.5" HH	
Bare Drive Kit	\$499
16 Bit Kit (IDE)	\$519

213MB MX7213S (SCSI)	
15ms 3.5" HH	
Bare Drive Kit	\$499
16 Bit Kit (SCSI)	\$649

ALL BARE DRIVE KITS INCLUDE: All mounting hardware, "Disk Manager" formatting, partitioning software if necessary, and HDI's Hard Drive Reference Manual with complete installation instructions.

ALL 8 & 16 BIT KITS INCLUDE: 16-Bit host adaptor hard/floppy "1 to 1" controller or interface card, mounting kit (3.5" kit inc. beige & black barrels), rails, cables, all mounting hardware, "Disk Manager" software (if applicable) and manual.

COMPLETE INSTRUCTIONS

EVERYTHING YOU NEED!

ALWAYS LOW PRICES SOFTWARE! SUPER LOW WITH PURCHASE OF HARDWARE Call for details

HARD DRIVES International

IBM PS/2 KITS

For Models 50, 50Z, 55, 60, 70, & 80.

Capacity	Drive	Internal	External
120MB	MX7120S	\$579	\$649
213MB	MX7213S	\$779	\$829
330MB	FJ2622S	\$1149	\$1239
520MB	FJ2624S	\$1189	\$1319
660MB	MC1624 *	\$1619	N/A
1034MB	MC1598 *	\$2279	\$2329
1354MB	MC1528	N/A	\$2539

All Kits Include: HDD, Controller, Case, Cable, Software & Manual.

*For models 70 and 80 only.

TAPE BACK-UP

INCLUDED TAPE

Talon

120MB \$189

with data compression

250MB \$289

with data compression

Standard QIC 80 attaches to existing floppy controller or dedicated unit. 2-3Mb/min. Both include one tape.

COLORADO MEMORY SYSTEMS INC.

120MB \$199

with data compression

250MB \$299

with data compression

Standard QIC 80 attaches to existing floppy controller or dedicated unit. 2-3Mb/min.

WANGDAT

3.5" Internal and External Tape Back-up 22MB/minute

2GB DAT (3100)

Internal \$1349
External \$1449

4GB DAT (3200)

Internal \$1549
External \$1649

SANKYO

250MB

QIC Interface - 5MB/min

Internal \$695

External \$795

SCSI Interface 7.10MB/min

Internal \$895

External \$995

525MB

SCSI Interface 7.10MB/min

Internal \$995

External \$1195

1 Gig.

SCSI Interface 10MB/min

Internal \$1295

External \$1495

ARCHIVE

250MB QIC Interface

Internal \$799

External \$899

1300MB DAT SCSI 16Bit

Internal \$1595

External \$1795

Price covers for Access & Data

CD-ROM

TALON TA-100

Internal CD-ROM

600ms Access Time
32KB Buffer
150KB/sec. Transfer Rate

\$299

SONY 535

Internal CD-ROM

340ms Access Time
8KB Buffer
150KB Transfer Rate

\$399

TALON TA-200

High Performance Internal CD-ROM

280ms Access Time
64KB Buffer
300KB/sec. Transfer Rate

\$599

New 1992 Grolier Multimedia Encyclopedia FREE with the purchase of any of the above CD-ROM Drives

Complete 21 volume set, revised and updated for 1992. Over 33,000 articles brought to life with 3,000 high-resolution pictures, 250 color detailed maps, 35 minutes of high quality video, 35 minutes of professionally edited sound recordings and 55 exciting video sequences - All linked together with Knowledge Tree™ software that makes it easy to make broad searches into specific areas of interest.

CD-ROM SOFTWARE!* Pick any 5 for \$99

*With the purchase of a CD-ROM Drive

Aircraft Encyclopedia
Bible Library
Career Opportunities
CIA Factbook
Civil War
European Monarchs
Game Pack II

Guinness Disc
Great Cities
Interactive Storytime
KGB Factbook
Korea
Mavis Beacon Typing
North American Indians

Plant Doctor
Reference Library
Sound Works
Space Apollo
Timetable of Arts
Time Table of Science

USA State Fact Book
U.S. Atlas
U.S. Civics
U.S. Presidents
Vietnam
World Atlas
World War II

SoundBlaster Pro
\$185

Pro Audio
Spectrum 16
\$229

SIMM

Great for 286/386/486

1MB	x9	80ns	\$ 38
1MB	x9	70ns	\$ 38
256Kb	x9	70ns	\$ 15
4MB	x9	70ns	\$128

ADD 1MB RAM AS LOW AS \$38

32-BIT

512KB	x36	32bit	\$119
1MB	x36	32bit	\$199

HDI has the widest selection of memory. Call for pricing.

Worry-Free 30 Day Guarantee

FOR THE BEST PRICE, SERVICE & SUPPORT CALL:

800/755-9679

HDI SALES: 602/350-1128
FAX 602/350-1150

NATIONAL ACCOUNTS

Purchase Orders

800/927-2907

FAX 602/350-1180

International: 602/350-1144
FAX 602/350-1188

APQ/FPO: 602/350-1145

Order Status: 800/729-4490

FREE TECHNICAL SUPPORT

WE SHIP VIA FEDERAL EXPRESS 80% OF ORDERS DELIVERED NEXT DAY!

INTRODUCING THE INSIGHT CREDIT CARD

CALL FOR DETAILS
800/755-0822



NEVER A SURCHARGE FOR CREDIT CARDS



Prices and availability subject to change without notice. All items NEW. PO's accepted from qualified buyers. Net 20. APO/FPO orders add \$16 shipping. 30 Day Guarantee & 1-Year Replacement Policy may have some restrictions. Shipping is not refundable. All trademarks are the property of their respective owners. 10.92

Hard Drives International
1912 W. 4th St., Dept. HKR
Tempe, AZ 85281

ALWAYS LOW PRICES SOFTWARE!

800/755-9679

PURCHASE ORDERS/NATIONAL ACCOUNTS 800/927-2907

HARD DRIVES

International

HKR

Toshiba Direct

- ✓ Guaranteed lowest price on every system
- ✓ 30-day unconditional money-back guarantee
- ✓ 30-day price protection
- ✓ FREE lifetime toll-free technical support
- ✓ Systems configured with everything you need
- ✓ Toshiba 1-year warranty
- ✓ GUARANTEED overnight delivery available
- ✓ Low-cost leasing and flexible payment plans
- ✓ Free expert advice to help you make the right decision

PCs COMPLEAT offers customers the brand name choices of a superstore, the value and convenience of a traditional direct seller, with service and support neither can match. Discover why *PCs COMPLEAT* is quickly becoming America's "one-call" source for maximum PC value.

PCs COMPLEAT

Real Service • Unreal Prices

1-800-669-4727



T3300SL

386SL/25

- 2MB RAM, expandable to 18MB
- 80MB hard drive
- Nickel Hydride 3 hour battery
- LCD display with 32 gray scales
- Weight 5.9lbs
- DOS 5.0

120MB drive configuration \$2849

Lease for \$91.95/mo.

Limited time offer.

\$2439



T4400SX

486SX/25

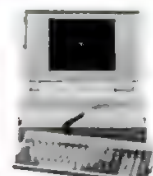
- 2MB RAM expandable to 18MB
- 80MB hard drive
- NiCad 3 hour battery
- LCD display with 64 gray scales
- Weight 7.25lbs
- DOS 5.0

Lease for \$112.68/mo.

120MB drive configuration \$3329

13 Toshiba models available.

\$2989



T6400DX

486DX/33

- 4MB RAM, expandable to 36MB
- 200MB Hard drive
- Gas Plasma display with 16 gray scales
- 1 full length 16-bit ISA slot
- 101-key detachable keyboard
- Weight 11.7lbs
- DOS 5.0

Lease for \$201.65/mo.
Active matrix color display
configuration \$7749

\$5349

Prices change frequently. When you call *PCs COMPLEAT*, you'll always get the best available price. *PCs COMPLEAT*, 495 Technology Center West, 34 St. Martin Drive, Marlborough, MA 01752. Telephone: 1-800-669-4727 FAX: 1-800-669-8329. All prices are subject to change and do not include shipping. Lease prices reflect 36 month operations lease available to approved business customers. Toshiba is a trademark of Toshiba America Information Systems, Inc.

Hours of operation: Monday-Friday, 9 a.m.-9 p.m., ET, Saturday 10 a.m.-6 p.m., Sunday, Noon-6 p.m.

From outside the U.S., call 508-624-6400 24-hour toll-free FAX order line: 1-800-669-8329

HARD DRIVES

SEAGATE

All SEAGATE Drives include: Universal Installation Manual, AT Ribs & Cable

ST-225 MFM	5.25"	21.4MB/65MS	\$179
ST-251-1 MFM	5.25"	42.8MB/8MS	\$239
ST-296H SCSI	5.25"	14.1MB/28MS	\$269
ST-351A IDE	3.5"	42MB/28MS	\$195
ST-3120A IDE	3.5"	105.9MB/16MS	\$289
ST-3144A IDE	3.5"	133/7MB/16MS	\$325
ST-3283A IDE	3.5"	245MB/12MS	\$649
ST-3283H SCSI	3.5"	245MB/12MS	\$669
ST-43A IDE	3.5"	214MB/16MS	CALL

Free Shipping on Wren Family Drives:
ST-4766E ESDI 5.25" 676MB/15 S/Ms \$1,299
ST-4766H SCSI 5.25" 676MB/15 S/Ms \$1,299
ST-41200N SCSI 5.25" 1050MB/16 S/Ms \$1,799
ST-41200NV NOV 5.25" 1050MB/16 S/Ms \$1,799
ST-41650N SCSI 5.25" 1420MB/17 S/Ms \$2,239

ST-01 / ST-02 SCSI	\$29 / \$45
ST-07 / ST-08 IDE C	\$29 / \$39
ST-11M MFM / ST-11R RLL	\$51 / \$51
ST-21M MFM / ST-21R RLL	\$39 / \$39
ST-22M MFM / ST-22R RLL	\$67 / \$65

IDE 52/80/105 MG LPS	\$205/305/319
IDE 120/240 MG LPS	\$355/3629
SCSI 52/105 MG LPS	\$205/3329
SCSI 120/240 MG LPS	\$409/3655
SCSI 425 ProDrive FREE DELIVERY	\$1,399

IDE 7120A/7213A	\$325 / \$479
SCSI 7120/7213	\$345 / \$519

PLUS DEVELOPMENT

Hardcard II XL 50/105 \$269 / \$425

MICROPOLIS

1528 SCSI-2 Full	1341MB/14 S/Ms	\$1,899
1548 SCSI-2 Full	1748MB/11 S/Ms	\$2,499
1568 ESDI/15MHz Full	676MB/16MS	\$1,349
1598 SCSI-2 Full	1036MB/16MS	\$1,769
1624 SCSI-2 Half	668MB/15MS	\$1,349
1684 ESDI/15MHz Half	344MB/15MS	\$899
1684 SCSI Half	340MB/15MS	\$1,099
1908 SCSI-2 Half	1408MB/10MS	\$2,399
1924 SCSI-2 Half	2070MB/11 S/Ms	\$3,599

Free Delivery on Micropolis Drives in the Contiguous 48 States!

FLOPPY DRIVES

CHINON

5.25" 1.2MB PC/AT	\$59
3.5" with Frame 1.44MB PC/AT	\$59

CANON

ALL MEDIA FLOPPY The All-In-One 3.5" & 5.25" Half Height Int. Floppy Drive \$149

REMOVABLE CARTRIDGE DRIVES

SYDOS

A Division of Syquest Tech.

441 Internal / 44E External Kit	\$439/\$489
442 Dual	\$999
88E External Kit w/8 Bit Adaptor	\$599
88L Internal Kit w/8 Bit Adaptor	\$559
88E External Kit w/16 Bit Adaptor	\$789
88L Internal Kit w/16 Bit Adaptor	\$729
88/2 Dual External Kit w/16 Bit Adaptor	\$1299

Kits includes: drive, host adaptor, media cartridge (2 w/dual), installation software, cables, manuals & Super PC Kwik
Sydos Cartridge Packages come with 2 yr warranty on drive, 5 yr warranty on media

TAPE BACK UP

COLORADO MEMORY

DJ10-120MB	\$185
Adaptors AB11 Ext / KE10 Ext	\$37/\$109
DJ20-250MB	\$245
Adaptors FC10 Ext / KE10 Ext	\$79 / \$109

IRWIN

Accutrak 120/250 Standard Int.	\$185/\$230
Accutrak 120 Plus Int. Ext.	\$239/\$315
Accutrak 250 Plus Int. Ext.	\$299/\$379
Adaptor Board 4251 for Plus Ext.	\$75
Accelerator Board 4100	\$119

SOUND BOARDS

Sound Blaster	\$99
Sound Blaster Pro Basic	\$159
Sound Blaster Professional	\$185
Pro Audio Spectrum PLUS / 16	\$185 / \$225
Thunderboard / for Windows	\$92 / \$105
Audio Pro	\$139
Sound Master II with Speaker	\$149
Turtle Beach Syst. MultiSound 16 bit, MPC	Call

PRINTERS

PANASONIC

KX-P 1123	\$199	KX-P 2123	\$229
KX-P 2180	\$169	w/Color Kit	\$179
KX-P 1124i	\$285	w/Color Kit	\$315
KX-P 1624	\$345	KX-P 4430	\$999
KX-P 2624	\$365	KX-P 4455	
KX-P 4410	\$649	FREE DEL.	\$1,749

CITIZEN

200 GX / with Color Kit	\$155/\$199
200 GX 15 / with Color Kit	\$235/\$359
GSX 130 / with Color Kit	\$235/\$269
GSX 140 LPS / with Color Kit	\$309/\$335
GSX 145 Wide with Color Kit	\$365/\$425
GSX 230 Outlet Tech / 240 Color Option	Call
PM48 Notebook	\$289
PM 48 Professional Kit	\$329

STAR

NX-1001 Multifont	\$135
NX-1020 Rainbow	\$179
NX-2420 Rainbow	\$285
NX-2430 Black	\$235
Star Jet 48	\$285

QMS postscript

PS 410	\$1539
PS 815 / 825	\$2769/\$3349
PS 815MR/825 (dual bin)	\$3819/\$4509
Model 10P/10	\$4819 / \$5889
Model 30	

Math Coprocessors

LOWEST PRICES EVER!

IIT

2087 - 10	\$55
3087 - 25	\$85
3087 - 33 / 40	\$89 / \$115
3087SX - 16/20/25/33	\$69/\$69/\$69/\$89

CYRIX

82587XL	\$75
82587S X-16/20/25/33 each	\$72/\$72/\$72/\$92
82587 - 25 / 33 / 40	\$92/\$92/\$115

INTEL

287XL NEW	\$85
80387 SX - 16 / 25 each	\$85
80387 - 16 / 20 / 25 / 33 each	\$95

MICE/SCANNERS

GOLDEN IMAGE

PowerPen	\$49
Seral Mouse	\$17
Digital Eye Scanner 64 / 256	\$89/\$159

LOGITECH

Dexox Serial / for Windows	\$29 / \$67
KIDZ Mouse	\$42
Mouserman Serial / Windows	\$67/\$105
Trackman II NEW / Portable	\$79/\$95
Mouserman Cordless	
Scanman Model 256 (gray scale)	\$259
Scanman 256 w/Perceive OCR	\$289
Scanman Color Hand Held Scanner	\$579
FotoMini	Call

CD-ROM MULTIMEDIA

NEC

CDR-74 Gallery, External	\$769
CD-ROM Drive alone	
CDR 84 Int / CDR 74 Ext	\$519 / \$559
CD-ROM Drive Upgrade Kit	
CDR 84 Int / CDR 74 Ext	\$1,179 / \$1,249
CDR 37 Portable	\$999

CREATIVE LABS

SB Pro MM Upgrade Kit	\$559
CD-ROM Drive Kit	\$369
Multimedia Starter Kit	\$449

SONY

External CD-ROM Package	
CDU-7205 with Software Titles	
Call for Low Price!	

MEDIA VISION

Pro 16 Multimedia System	
Call for Low Price!	

VIDEO BOARDS

UNITED SOLUTIONS

Image 800 8 with 256 K	\$42
1024/WA with 512K Windows Accelerator	\$75
Ultra Image 1 Meg VGA	\$125
Ultra Image Hi Color 1MB 1 VGA	\$135

PARADISE

SVGA Accelerator 1 MB for Windows	\$209
-----------------------------------	-------

MONITORS

PANASONIC

Pync C1381, 28DP, 1024x658	\$309
Panasyric C1395, Non-Interlaced	
28DP, 1024 x 768	\$429

PACKARD BELL

8538, 390P 1024 x 768	\$245
8548 SVGL, Non-Interlaced	
28 1024 x 768	\$365
8517, 17" Non-Interlaced,	
31DP 1280 x 1024	\$940

SONY

1304S Non-Inter. 250P 1024x768	\$599
1604S Non-Inter. 250P 1024x768	\$1,039

MODEMS

ZOOM

AMC 2400 Internal with RPI	\$59
AMX 2400 External with RPI	\$65
AF 2400 Send/Rec 48 RPI Int.	\$72
AF 2400 Send 96/Rec 48 RPI Ext.	\$79
FC 2400 Send/Rec 9600 Internal	\$99
FX 2400 Send/Rec 9600 External	\$99
2400 V 42 Send/Rec 9600 with Winfax	
FCV Internal / FXV External	\$135 / \$155
V 42X 2400 V 42 External	\$115
V 32 bis Internal/External	\$235/\$295
V 32 bis Send/Receive 14,400 Int.	\$259
V 32 bis Send/Receive 14,400 Ext.	\$285

SUPRA

2400 Internal w/ Mirror II	\$55
2400 External	\$72
2400 Plus Int w/ MNPS V 42 BIS	\$109
2400 Plus Ext w/ MNPS V 42 BIS	\$119
Fax Modem Plus 2400 Internal	
with V 42 & MNPS for DOS/Win	\$129/145
Fax Modem Plus 2400 External	
with V 42 & MNPS for DOS/Win	\$149/165
Fax Modem V 32, Ext. alone	\$239
with Fax Software, DOS/Win	\$259 / \$279
FaxModem V 32 bis, Ext. alone	\$309
w/Fax Software DOS/Win/Mac	\$329/329/379

NETWORKING

ARTISOFT

AE/IT Ethernet Adaptor	\$135
AE/IT Ethernet Adaptor	\$195
AE-2 Ethernet Starter Kit/Adaptor	\$445/\$195
AE-2 Windows Starter Kit	\$505
AE-3 ISA Starter Kit/Adaptor	\$515/\$229
AE-3 Windows Starter Kit	\$569
2 Mbps Starter Kit/Adaptor	\$319/\$129
2 Mbps Windows Starter Kit	\$385
2 Z Two Station Kit	\$87
10 Base/T Starter Kit	\$599
Peer Hub 10 Base/T Connector	\$259
Peer Hub 10 Interface Kit	\$259
Lanistic Hub	\$319
Hub Installer Kit	\$115
Artisoft Digital Dictation Starter Kit	\$449
Artisoft Central Station	
Lanistic Voice Adaptor	\$75
Network Eye	\$115
Lanistic for Windows/Netware	\$165/\$265
AE-2 Ethernet Software	\$75
Arbcom	\$219
AI V 4.1	\$59
AI Unlimited (up to 300 users) V4.1	\$1,349

3COM

Etherlink II 8 Bit (3C503R)	\$185
Etherlink II/16 8/16 (3C503-16)	\$155
Etherlink 16, 16 Bit (3C507)	\$275

NOVELL / EAGLE

Netware Link NE2000 Starter Kit	
w/Link Mail 3.5" / 5.25"	\$395 / \$395
Netware Link Add-on Kit (NE2000) 5.25"	\$199
Netware Link Add-on Kit (NE2000) 3.5"	\$199
NE1000, 8 Bit Ethernet Card w/o Cable	\$129
NE2000, 16 Bit Ethernet Card w/o Cable	\$155

SMC

EtherCard Elite 16 Combo	\$185
EtherCard PLUS Elite, 8 Bit/16 Bit	\$119/\$155
Arconet PC 130, 8 Bit	\$69
Arconet PC 130 E, 8 Bit	\$95
Ethernet, 8 Bit CoAx, PC Card	\$99
EtherCard PLUS Elite (16T)	\$165
EtherCard PLUS (10T)	\$139

THOMAS-CONRAD

TC 8245-HZ ARC Card, 16 Bit Bus	\$179
TC 8245 ARC Card, 16 Bit AH-In-One	\$255
TC 8242 TP-ARC Card, 8 Bit Twisted Pair	\$99
TC 8242 OTP ARC Card, 8 Bit Twisted Pair	\$75

KIRCOM

Simplicity Starter Kit 3.5/5.25"	\$599/\$599
Simplicity Expander Pack 3.5/5.25"	\$279/\$279

Call For Complete Lines of PC Networking!

We Have

Hundreds of
Titles - Call

SOFTWARE SOFTWARE

1st ACT!	44.95	Power Basic V 2.1	69.95
386 To The Max 6.0 w/Windows Em	58.95	Print Shop Deluxe	44.95
ACT-2.1 for Win 1.0	214.95/229.95	Professional Write 2.2	157.95
Adaptive Text Manager 2.0 for Win	54.95	Procom Plus 2.1/Win	70.95/77.95
After Dark for Windows V 2.0	28.95	Prology Starter Kit V 3.1	25.95
All Type DOS & Windows	42.95	Professional Write Plus for Win 1.0	157.95
Affinity Home/Business	42.95/42.95	Publishers Powerpak w/SuperFont	43.95
Animation Works Interactive for Win	282.95	Q & A Network Pack V 4.0	314.95
Approach for Windows	254.95	Q & A V 4.0	244.95
Auto Map/Map Europe	47.95/50.95	Quattro Pro 4.0 NEW	57.95
Auto Sketch 3.0	139.95	Quattro Pro 4.0	304.95
Back It 4.0 / Windows	69.95/42.95	Quattro Pro SE	44.95
BeMac for DOS/Windows	44.95/44.95	QuickBooks	84.95
BeMac / BeMac for Windows Bundle	72.95	Quicken 5.0 / Windows	41.95/41.95
BeMac for Windows	44.95	Road Scholar	30.95
BeMac Builder V 4.0a	74.95	Science Adventure	49.95
BodyWorks	39.95	Screen Craze for Windows	29.95
Borland C++ 3.1	329.95	Sideways 3.0	52.95
Carbon Copy Plus 6.0/Windows	127.95/127.95	Software Bridge 5.1	99.95
Central Point Anti-Virus for Windows	77.95	Spanish Assistant	39.95
Check It Plus	77.95	Spiralnote II 2.0	58.95
Chemistry Works	39.95	Sports Adventure	49.95
Claron Pro Dev 2.1 w/Port Writer	442.95	Stacker AT/16.2.0	179.95
Close-Up DOS & Windows	359.95	Stacker 2.0	79.95
Comel Draw 3.0 for Windows	354.95	SuperCalc 4.1	47.95
Co-Session (2 user)	95.95	SuperCalc 5.1	87.95
Curtain Call	108.95	SuperOffice Windows	264.95
Daisy Disk II 1.5	219.95	SuperStar 2.0	74.95
Describe Word Processor 3.0	119.95	Tamagotchi	44.95
Design CAD 20.0	232.95	TimeLine 5.0 / Windows	439.95/439.95
Design CAD 30.0	232.95	Timeslips 5.0	182.95
DEServe 386 V 4.0	128.95	Turbo C++ 3.0 / Windows 3.1	66.95/96.95
DesignCAD 300	181.95	Turbo CAD	64.95
Direct Access 5.1	59.95	Turbo EMS 6.0	48.95
Direct Access 1.0 for Win	59.95	Turbo Pascal Pro 6.0	199.95
Distant Suns for Win	64.95	Turbo Pascal for Win	99.95
DR DOS 6.0	64.95	Unichange 1.1	44.95
DR DOS for Windows 2.0	399.95	VirCode Plus	55.95
Dynamic-Menu for Windows Async	44.95	VisaPro	64.95
Enable C/A 4.5	464.95	Windows Draw	94.95
Express Presenter DOS	81.95	WinFax Pro 2.0	79.95
Express Publisher 2.0 Windows	56.95/56.95	WinSpeed	69.95
Express Publisher 2.0	26.95	WinWork for Windows	259.95/259.95
Fast Back-A-Job v2.1	15.95/12.95	WordPerfect 5.1/Windows	259.95/259.95
File Unchanging 3.2.1 (single user)	132.95	Xtreme Software for DOS	53.95
Fonts on the Fly 2.1	81.95	Xtreme Gold 2.5	92.95

24 HOURS
Sales & Service

INTERNATIONAL ORDERS WELCOME

MON-ONLY
TODAY



"YOUR SOFTWARE SPECIALISTS"

TO ORDER CALL TOLL FREE
1-800-822-8088

★ CALL FOR OUR FREE CATALOG ★

"GIVE US THE OPPORTUNITY TO BEAT ANY ADVERTISED PRICE"

★ SUPER SPECIALS ★

MS Windows 3.1

\$ 85

ACCOUNTING

Accpac Simply Accounting for DOS
Accpac BPI G/A, A/R, A/P, I/C
Accpac Plus G/L, A/R, A/P, Payroll ea
Accpac Plus I/C, O/E, R/I, J/C ea
Accpac Plus Windowing Mgr
Businessworks Bundle
DAC Easy Accounting/Payroll 4.2
DAC Easy Bonus Pak 4.2
DAC Easy Network
Great American Works
MicroBiz Retail Store Controller
Pacioli 2000
Peachtree Complete III Accounting
Peachtree w/Data Query III
Profitwise Power Pak
Profitwise Acctg (10-Pak)
Timeslips III

116
225
489
489
409
85/57
118
275
489
29
138
207
289
218
177

C.A.D.

Autocad 10
Autocad v. 11
Autosketch 3.0
DesignCAD 3D
Design CAD 5.0
Drafix CAD Ultra
Generic 3D Drafting
Generic CADD 6.0
Generic CADD Starter Kit
Mathcad 2.5
Mathcad-Advanced Math Pak
Turbo CAD

2499
2899
137
185
189
227
199
267
85
295
75
75

COMMUNICATIONS

Brooklyn Bridge 3.0
Carbon Copy Plus
Close-Up Customer
Close-Up Support
CoSession 2-user
Crosstalk Communicator
Crosstalk Mark IV
Lap Link Pro
Mirror III
PC Anywhere III
PC Anywhere 4.5
PC Anywhere LAN
Procom Plus

82
107
115
139
95
50
125
99
59
109
335
67

DATABASE

Advanced Revelation
Alpha IV
AskSam
Clipper 5.01
Database
Data Flex 3.0
Database
dBase III Plus
dBase IV 1.1
dBase IV Developer's Kit 1.1
dBase 1.3
Foxbase Plus 2.1 LAN
Foxbase Plus 2.1 S/U runtime
Foxbase 2.1 - Single User
Foxbase Plus LAN Runtime
Fox Pro 2.0
Fox Pro LAN (6-Pak)
Fox Pro Distribution Kit
Informix 4GL Compiled
Informix 4GL Compiled Runtime
Informix SQL
Informix SQL Runtime
Paradox 3.5
Paradox Comp. Upgrade
PC File 6.0
PC File LAN
PPS Professional File
Q & A 4.0
Quicksilver Diamond
R&R Code Generator
R&R Reportwriter (dBase)
RBase for DOS 3.1
RBase 2.0
UI Programmer 2.1

739
309
202
479
489
272
419
485
785
127
275
249
177
439
499
279
648
189
579
169
467
155
63
182
245
325
112
142
459
157
329

DESKTOP PUBLISHING

Adobe Illustrator Windows
Express Publisher
First Publisher 3.0
Newmaster II
Newstream Pro
PageMaker 4.0
Publish II 2.0
Publishers Paintbrush
Publishers Power P/W/P or Word
Publisher's Type Foundry
Ventura Gold For DOS

89
309
69
49
479
129
279
44
309
489

FINANCE

Managing Your Money
Market Analyzer Plus
Money Counts
Money Matters
Quicken 5.0

105
279
39
39
39

GRAPHICS

Applause II
Harvard Graphics 3.0
Micrografix Charisma
Stargraphics 4.0

229
375
315
589

INTEGRATED

First Choice
Geoworks Pro
Lotus Symphony 2.2
Lotus Works
Microsoft Works
Smartware II

116
225
489
85
89
427

MICE & SCANNERS

IMSI Mouse
Kensington Expert Mouse PC
Kraft Trackball
Logitech Mouse Man-Bus
Logitech Mouse Man-Serial
Logitech Mouse (Serial)/Windows 3.0
Logitech Scanman 256
Logitech Scanman 32
Logitech Trackman
Microsoft Mouse
Microsoft Mouse w/Paintbrush
Microsoft Mouse w/Windows 3.0
MS Mouse (5 Pak)
PC Trackball (serial)

2499
2899
137
185
189
227
199
267
85
295
75
75

NETWORKING

Deslink 2.2
Lantastic Ethernet Starter
Lantastic Network Eye
Lantastic Starter Kit
Novell Netware 2.2 5 user
Novell Netware 2.2 10 user
Novell Netware 2.2 50 user
Novell Netware 3.11 20 user
Novell Netware 3.11 100 user
Novell Netware Lite

469
129
339
539
1249
2399
2149
4599
69

PAINTING

Arts & Letters Graphics Editor
Calendar Creator plus
Corel Draw
Deluxe Paint II Enhanced
Designer 3.0
Dr. Halo 4
Draw Perfect
Flowcharting III
Formiller
Formplot Gold
Formworks For DOS
GEM/3 Draw Plus
Grasp
Gray F/X
IBM Storyboard Live
Lotus Freelance Graphics
Org Plus Advanced
PC Globe
PC Paintbrush IV Plus
PC USA
Per Form
Pizzazz Plus
Printmaster Plus
Printshop
Softtype

359
355
77
435
69
297
135
75
53
89
157
239
299
279
309
62
29
109
39
89
62
33
245
115

PROGRAMMING

APL Plus/PC
Borland C++
Brief Editor
Brief dBrief
Clarion Personal Developer 2.0
Clarion Professional Developer 2.1
i-Edit
Microsoft Basic PDS 7.1
Microsoft C Compiler 6.0
Microsoft Cobol Compiler
Microsoft Fortran 5.0
Microsoft Macro Assembler 6.0
Matrix Layout
Microsoft Quick C
Microsoft Quick Pascal
Microsoft QuickBasic 4.5
MS Quick C/Assembler
MS Windows Development Kit 3.0
Powerbasic
RM Cobol 85
Smalltalk V For Windows
SPF/PC
Turbo Debugger
Turbo C++
Turbo Pascal 6.0
Turbo Pascal Prof

439
317
189
239
42
445
69
292
292
532
272
89
229
59
59
120
305
75
779
289
179
92
92
92
182

PROJECT MANAGEMENT

Harvard Project Manager 3.0
Project Scheduler V
Superproject 2.0
Timeline 2.0
Timeline 5.0 LAN Pak

419
427
539
439
379

SPREADSHEETS

Lotus 1-2-3 2.3
Lotus 1-2-3 2.3 Server
Lotus 1-2-3 3.1 Plus
Lotus 1-2-3 3.1 Plus Server
LUCID 3D
Microsoft Excel
Microsoft Multiplan
Quattro Pro 4.0

322
569
395
629
39
222
115
305

UTILITIES

Quattro Pro LAN Pak
Quattro Pro Upgrade
Supercalc V
386 Max 6.0
Above Disc Plus
Act I
Allways 1.2
Ami Diag
Battery Watch Pro
Catchword
Check-It
Control Room
Copy II PC
Copy II PC Deluxe Option Board
Desqview
Desqview 386
Direct Access 5.0
Direct Access Network
Disk Manager
Disk Optimizer
Disk Technician Gold
Diskette Manager III
D R D 5.0
FAST I
Fastback Plus
Fastlynx
Fastpak Mail
Fasttrak
Flight Simulator 4.0
Geoworks Ensemble
Go-Script 4.0
Go-Script Plus 4.0
HDC Windows Express
Hi-Jack
InfoSelect
Instant Recall
Ko-Pilot for WP
Label Pro
Labels Unlimited
Le Menu Plus
Lotus Agenda
Lotus Megatran 2.0
Mace 1990
Mavis Beacon Teaches Typing
Memory Mails
Menuworks Personal
Microsoft DOS 5.0 Upgrade
Microsoft DOS 5.0 w/O Basic
Microsoft Learning DOS
Microsoft Windows 3.0
Netroom
Norton Utilities 6.01
Norton Anti-Virus
Norton Backup
Norton Commander 3.0
Norton Editor
Optune
OS/2 Extended
OS/2 Standard
Pathfinder 4.11
Pathfinder Plus
PC Tools 7.1
Print-O 5.0
Prokey Plus
QA Plus
QDOS III
QEMM
QRAM
Readright For Windows
Sidekick 2.0
Sideways 3.3
Software Bridge
Software Carousel
Speedstor
Speedstor w/Card
Spinrite II
SQZ
Stacker
Stacker w/Board AT
Stacker w/Board XT
Super PC Kwik
Super PC Kwik/Power Pak
Superstar
Switch-It
Turbo EMS
Turbo Tutor V+
UltraScript PC
UltraScript PC Plus
VGA Dimmer
Willmaker
Wonder Plus
Word for Word Professional
Xtree Gold

259
89
85
89
427
112
45
89
89
65
85
112
297
89
82
95
147
375
55
97
469
129
339
539
1249
2399
2149
4599
69
359
355
77
435
69
297
135
75
53
89
157
239
299
279
309
62
29
109
39
89
62
33
245
115

WINDOWS

AccPac Simply Accounting
Actor
Adobe Illustrator Windows
Adobe Type Manager
Adobe Type Mgr Plus Pak
After Dark For Windows
Becker Tools For Windows
Cores Draw
Crosstalk for Windows
Crystal Accounting
Designer 3.0
Desktop Set
DraFix CAD For Windows
DynaComm
Facelift
Form Work for Windows
HDC First Apps
HDC Icon Designer
HDC Windows Express
Lantastic For Windows
Lotus 1-2-3 For Windows
Mathcad For Windows
Microsoft Office For Windows
MS Excel 3.0
MS Project For Windows
MS Quick C for Windows
MS Windows 3.0
MS Windows Development Kit 3.0
New Wave
Norton Desktop For Windows
Objectvision For Windows
Onpage Professional
Packrat 3.0
Pagemaker 4.0
Perform Pro
Powerpoint for Windows 3.0
Pro Write Plus For Windows
Publishers Power Pak For Windows
Soft Type
Superbase IV Windows
Toolbook
Turbo C++ For Windows
Turbo Pascal For Windows
Ventura Gold For Windows
Winconnect
32 Windows
WinFax Pro
Wordscan
Word Perfect For Windows
Wordscan Plus

89
85
119
179
309
82
29
69
355
114
173
435
69
369
179
57
115
13
125
59
359
37
37
35
35
57
112
79
47
47
37
129
85
172
47
85
82
97
44
54
62
129
97
92
35
29
58
75

WORDPROCESSING

Ami Professional
Grammatik For Windows
Grammatik V
IBM Displaywrite V
Letterperfect
Microsoft Word 5.5
Microsoft Word For Windows
Multimate 4.0
Personal Law Firm
Rightwrite 4.0
Wordperfect 5.1
Wordperfect 5.1 Upgrade
Wordperfect Office PC
Wordperfect Office PC (1-5u)
Wordperfect Office PC (1-20u)
Wordstar 6.0
Xywrite III+
Zyindex 3.1

107
80
85
97
45
489
149
47
89
107
69
62
62
47
309
57
55
75
62
47
47
47
309
57
55

XENIX / UNIX

Informix 4GL-Xenix 386
Informix 4GL-Xenix 386 Runtime
Lotus 1-2-3 for Unix V
MS Word 5.0 for Xenix/Unix
Norton Utilities For Unix
RM Cobol 85 for Unix 386
SCO Foxbase + 386 Run-Xenix
SCO Foxbase + 386-Xenix
SCO Lynx 386-Xenix
SCO Manager 386-Xenix
SCO Professional 386-Xenix
SCO Unix 386 Development System
SCO Unix 386 Operating System
SCO VPIIX (3+ user)
SCO Xenix 386/AT Operating System
Wordperfect for SCO Xenix
Wordperfect for SCO Xenix (1-10u)
Wordperfect for SCO Xenix (1-5u)

1599
649
489
999
189
1499
349
629
449
599
899
899
899
329
599
779
599



TO ORDER BY FAX:

215-639-7234

For Products not Listed call:

215-639-7110

Please send all correspondence to:

Software Add-Ons
Two Greenwood Square
3331 Street Rd., Suite #155
Bensalem, PA 19020



Price, terms, and availability subject to change without notice

Policies:

- 1 - We accept VISA, MasterCard & Discover - No Surcharge
- 2 - Shipping - any item - \$8
- any 2 items - \$7
- 3 or more add 1%
- 3 - COD Charge of \$5 per order
- 4 - Purchase Orders must be approved.
- 5 - International Orders welcome (except Canada).
- 6 - DEALERS & VAR INQUIRES WELCOME
- 7 - Returns are subject to approval - 10% restocking fee.



PACIFIC WAVE

TECHNOLOGY

SPECIALIZING IN INTERNATIONAL ORDERS

COMPUTERS

IBM PS/2	
PS/2 Mod 35 SX 40	1350
PS/2 Mod 40 SX 40	1425
PS/2 Mod 56 SX 40/80 Mb	1995/2100
PS/2 Mod 57 SX 160 Mb	2100
PS/2 Mod 70 A81/A16	2100/2500
PS/2 Mod 80 320	3000
PS/2 Mod 90/95-486	Call

COMPAQ

Contura 3/20 40/84	1495/1750
Contura 3/25 60/120	1840/2195
Prolinea All Models	Call
LTE SL/25 60/80/120	2460/2640/2995
DPro 386 S 20 Mod 1/40 Mb	1655/2150
DPro 386/25 M (All Models)	Call
DPro 386/33 M (All Models)	Call
DPro 486/33 M (All Models)	Call

TEXAS INSTRUMENTS

Travelmate 3000 40/60/80/120	1850/2190/2500/2795
Travelmate 3000 Win SX 60/80/120	2499/2799/3095
Travelmate TM 4000 SX/16 80 Mb	2495
Travelmate TM 4000 SX/25 120 Mb	2995
Travelmate TM 4000 DX/25 120 Mb	3453

AST

Bravo 486 DX/33 MDL 3V	1699
Power Premium 386/33 MDL 3V	2022
Power Premium 486 DX 33 MDL 3V	2360
Power Premium 486-50 D MDL 3V	2591
Exec Notebook 386/20 40/60	1287/1372
Exec Notebook 386/25 60/80/120	1457/1720/1899
Exec/25 Color 60/80/120	2587/2760/2944

TOSHIBA

T2200 SX 80 Mb	2199
T3300 SL 80 120	2495/2700
T4400 SX-80 LCD/PDP	2890/3150
T4400 SX-120 LCD/PDP	3150/3399
T4400 SX/80 120	4250/4900
T5200 100/200/Color	3250/3700/4199
T6400 SX/SXC	4460/6299
T6400 DX/DXC	5475/7500

PACKARD BELL

Force 315, 386 SX/25, 107 Mb, 2 Mb	1246
Force 325 386 SX/25, 130 Mb, 4 Mb	1799
Force 545 486 DX/33, 130 Mb	1899
Force 546 486 DX/33, 210 Mb	1999
Force 600 486 DX/50, 210 Mb	1999
Force S16X, 386 SX/16, 85 Mb, 2 Mb, VGA	795

MONITORS & TERMINALS

MONO/COLOR	
IBM 8504/8512	250/439
Samsung RGB	200
Samsung 14" VGA Mono	129
Amber 12" TTL	85

VGA/EGA MONITORS

IBM 8515	595
Samsung Syncmaster 4 17"	775
NEC 3FGX/4FG	649/759
NEC 5FG/6FG	1299/2395
Packard Bell VGA 8539/29/28	230/270/359
Panasonic 1381/95/1991	339/479/1999
Sony CPD 1304/1604S	599/1019
Zenith 1492	595

VIDEO BOARDS

ATI Vantage 1 Mb	230
ATI 8514/Ultra 1 Mb	375
ATI Graphics Ultra 1 Mb	449
ATI VGA Wonder XL 512/1 Mb	145/159
Orchid ProDesigner II 512/1 Mb	186/230
Orchid Farenheit 1280 1 Mb	299
Paradise VGA+16	122/145
Paradise VGA 1024 256/512	159/199
Mono/w Parallel Card	45
VGA 1024 256/512	109/139

PRINTERS

CANON	
BJ 10 EX	320
BJ 20	410
BJ 300/330	439/599
CITIZEN	
GSX 130/140/145	259/299/399
PN 48 Professional	339

EPSON

Action Printer 3250	210
FX 850	289
FX 1050	389
LQ 570	265
LQ 870	445
LQ 1070	376
ES300 Color Scanner	799

HEWLETT-PACKARD

LaserJet 4	Call
LaserJet 3/3D/220 V	1489/2349/1795
LaserJet 3Si	3525
LaserJet 2P+3P	819/1028
Toner & Cable included with all lasers	
DeskJet 500/Color	409/719
ScanJet II P	870
ScanJet IIC Color Scanner	1495
PamJet XL 300	2325
HP Options	Call

FONTS & MEMORY

Pacific Data 25-1 III/Deskjet	259/109
Pacific Data 1/2/4 Mb	99/135/199
Pacific Page PE/XL	289/671
Pacific Data Plotter in a Ctg	239
Compag 1/4 Mb Modules	118/275
IBM/Ti/Toshiba AST	Call
CPI Superset 425+	219
CPI DeskRam 256k DJ500	89
CPI 66 Font DJ500	109

IBM (IBM & MAC)

Laser Printer SE/6	1159/1399
Laser Printer 10/10L	1499/2200
Laser Printer Options	Call
IBM 2390/2391	346/460

NEC

Silent Writer 990	2499
Silent Writer 2 Mod 95	1399
OKIDATA (IBM & MAC) 220V Available	
ML 184	215
ML 320/321	324/435
ML 390+/391+	444/599
ML 393+/393+color	919/999
Okilaser 400/800/810	609/929/1075
Okilaser 820/830/840	1276/1325/1549

PANASONIC

1123/1180	214/160
1124/1624	291/349
1654/1695/2624	528/364/479
2123/2124	250/Call
2180	181
4410/4430/4450/4455 Laser	675/899/1129/1893

TEXAS INSTRUMENTS

PS 17 Laser	1198
PS 35 Laser	1498

TERMINALS

Wyse 50/60	375/300
Wyse 30/85	310/339
Wyse 150/185	289/379

SOFTWARE

Ali Mac Titles Available	Call
Aldus Pagemaker 4.0	495
Ashton Tate dBase III+IV	419/479
Borland Quattro Pro 4.0	299
Carbon Copy 6.0	133
Compag/IBM DOS 5.0	89/125
Harvard Graphics 3 Q/Win	370/325
Laplink Pro	103
Lotus 1-2-3 2 4/3.1	329/399
Microsoft All Titles-Lowest Price	53
Microsoft DOS Upgrade	53
Microsoft Excel 4.0	295
Microsoft Office-Windows	479
Microsoft Windows 3.1	89
Microsoft Word-Windows	299
Microsoft Works-Windows	127
Norton Util 6.1	114
Procomm Plus V2	62
Quattro Pro	304
Quicken 5.0/Windows	39/45
Stacker 2.0	81
Ventura Publisher V 3.0	479
WordPerfect 5.1/Windows	260
1200 Additional Titles In Stock	

PLOTTERS & DIGITIZERS

HEWLETT-PACKARD	
7475A/7550B	1349/2699
7570A/7575A	2699/3350

7576 EXL	4150
SUMMAGRAPHICS	
Summasketch 2+ 12X12/12X18	320/515
CALCOMP	
Pacesetter 2024/2036	2899/3700
Digitizer 12X12/12X18	298/597

MULTIFUNCTION BOARDS CARDS & CHIPS

IBM 5250 Emulation	533
IBM 3278, 3279 Emulation	Call
Token Ring 16/4	625
AST 5251 Emulation	499
AST 6-Pack w/384 k	145
Intel AboveBoard Plus w/512 k	289
Intel 80287-XL	Call
Intel 80387-SX 16/20	Call
Intel 80387-DX	199
Cyrix Fasmath	Call

MODEMS & COMMUNICATIONS

ATI 9600 ETC	299
CPI 2400 Internal	49
Everex 2400/2400 MNP	99/164
Hayes 2400/2400B	289/218
Hayes Ultra 96	569
Hayes Ultra 144	760
Practical Pocket Modem	99
Practical 14.4 Int/Ext	365/395
Intel 14.4 Ext	453
MegaHertz Laptop Modems	Call
Supra 14.4 w/Fax	299
US Robotics Cour HST	550/585
US Robotics Dual Std	760/779

FAX MACHINES

Hewlett Packard Plain Paper 200/310	999/1325
Sharp FO 511	775
Intel Satisfaction 100/200	115/293
Intel Satisfaction 400/400E	395/437
US Robotics World Port 2496	259
MegaHertz Pocket 2400 S/R Fax	249
MegaHertz Pocket 96/96 SR	479

MICE

Logitech Mouseman	72
Logitech Scanman PC/PS/2	169/240
Microsoft Mouse/Windows 3.0	92/145
Microsoft Ballpoint	118

DRIVES TAPES

Colorado DJ10/20	199/259
Conner IDE 80/120/210	189/358/549
Creative Labs Multimedia Upg. Kit Int/Ext	546/606
Plus II XL50/105	299/450
Mountain All Models	Call
Panasonic LF 7010 1 Gb	
Erasable Optical Drive	2840
Procom Ext 5.25 PS/2	199
Procom PS2 Hard Drive 120/200 Mb	Call
Procom Laptop Floppy	199
System Mobile Disk 40/80/120	399/568/650

NETWORK

ARTISOFT	
Lantastic 2 Mb Starter Kit	338
Lantastic 2 Mb Adapter	139
Lantastic 10 Mb Starter Kit	469
Lantastic AE3 Starter Kit	539
Lantastic 10 Mb Adapter	199
NETWARE	
Netware 2.2 5-User	489
Netware 2.2 10-User	1162
Netware 3.11 5-User	663
Netware 3.11 10/20-User	1395/1995
Netware 3.11 100-User	3785
NE 1000/NE 2000	159/179
NE2 / NE 3200 (EISA)	249/749
SMC	
Arnet PC 130 8 Bit	99
Arnet PC 600 16 Bit	220
Arnet PC 600 ws 16 Bit	139
Ethercard Plus Elite 16	155

MISC. & ACCESSORIES

Keytronic KB101+	90
Kensington Masterpiece/Plus	85/95
AB Switch Box	27
Tripp Lite 500/1200/2000	296/618/1175
Tripp Lite Isotel	40

THE NEXT WAVE

1 (800) 348-4727



1 (800) 348-4727



0031-TT-1865

Interpreters
Available



0014-800-126-943



0130-816218

Interpreters
Available



0800-89-4935



For all other
countries, dial
800 887 51 100



In Hawaii (808) 875-1100
Shipping & Technical Assistance
1 (808) 875-1100
FAX (808) 875-0001
HOURS: 8:30 am - 5:30 pm CST
MON - FRI: 10 am - 4 pm CST, SAT: 10 am - 4 pm CST
PACIFIC WAVE TECHNOLOGY
P.O. BOX 840312
DALLAS, TX 75204-0312

Most orders shipped within 48 hours / 24-hour worldwide order tracking / Printer orders received by 9 PM CST can be shipped same day All credit card and COD orders checked electronically / We accept Amex, Visa, MC, JCB, Discover, Diners Club, Carte Blanche, COD's. Wire Transfer, TERMS & LEASE AVAILABLE (one day approval) Credit cards not charged until product shipped / GOVERNMENT AND EDUCATIONAL P.O.'S ARE WELCOME / Allow 10 days for personal checks to clear / Prices reflect a 3 percent cash discount / Non-defective returns subject to a restocking charge / All warranties good through Pacific Wave Technology / Prices subject to change without notice / All freight charges to be incurred by purchaser for refused COD shipments. / Please allow 24 hours on large credit card orders

LAPTOP COMPUTERS

AST Premium Exec 386/40 60/80MB	CALL
AST Premium Exec 386/25 60MB	CALL
AST Premium Exec 386/25 COLOR	CALL
Compaq Contour series	NEW
Compaq TE 386SX 70	CALL
Compaq TE 386SX 25	CALL
Everex Tempo X 60MB	CALL
Everex Tempo Camer	CALL
NEC Ultralite series	CALL
Texas Instruments TM3000	CALL
Texas Instruments 386 V NSX	CALL
Texas Instruments 486 WINSX	NEW
Toshiba T2200SX 80MB	2299
Toshiba T4400SX 80MB	2999
Toshiba T6400 color	CALL

COMPUTERS

AST Power Premium 386SX/25	1329
AST Power Premium 386DX/25	1644
Compaq Prolinea 386/25/25	769
Compaq Prolinea 486/33	1499
Compaq Deskpro 486/33/M210	2399
Compaq System Pro	ALL MODELS
DTK 286 386 486	custom quotes CALL
Packard Bell all models	CALL
Wyse Terminals 50/50/60	294 375/298

DISK DRIVES

Conner 120MB IDE	369
Conner 210MB IDE	559
Conner 540MB IDE	1249
Maxtor 7213A 213MB IDE	489
Maxtor LX7340A 340MB IDE	849
Microplus	ALL MODELS CALL
Pacific Rim External floppy drives	CALL
Plus Hardcard II XL 50MB	298
Plus Hardcard II XL 105MB	437
Seagate ST1144A 130mb 16ms IDE	324
Seagate ST1399A 211mb 15ms IDE	589
Teac 3.5" and 5.25" floppies	CALL
Teac dual floppy drive	167
Toshiba 12MB 1.44MB	69

MATH CO-PROCESSORS

Cym 80387DX-20/25	CALL
Cym 80387DX-33	FOR
Intel 80287XL	NEW
Intel 80387SL	LOW
Intel 80387SX-16	PRICES
Intel 80387SX-20	ON
Intel 80387DX-20/25/33	ALL
Wetzel	ALL MODELS CHIPS

MEMORY PRODUCTS

2MB for T1000SX/2E & T2000SX	269
2MB for T11M3000	199
1MB for Panasonic laser printers	CALL
256K/480K ORAM	5.50
256K/960K SIMM	14.00
1MB/960K SIMM	CALL
4MB/960K SIMM	CALL

MICE

Logitech Deska 2 button serial	39
Logitech Deska w/Windows 3.1	79
Logitech Mouseman	79
Microsoft bus or serial 400 dpi	89
Microsoft Ball Point mouse	125



QUALITY SERVICE & GUARANTEED LOWEST PRICING!

PRINTERS

PANASONIC

KXP1180/12180	149/179
KXP1123/12123	199/244
KXP1124/12124	275/319
KXP1824	339
KXP1854	535
KXP2624	365
KXP4410 Laser	645
KXP4430 Laser	889
KXP4450 Laser	CALL
KXP4455 Laser	CALL

NEC

P3200/P3300	239/339
P6200/P6300	419/569
P9300	869
LC90 Postscript	1545
LC95 Postscript	NEW
ColorMate Postscript	4499

DICOMIX by Kodak

150+ 180s	329/295
701 Inkjet	389
Color4 Inkjet	599

OKIDATA

184 Turbo	215
320 321	305/435
380+ 391+	435/595
383+ Color	999
Laser 400	595
Laser 800	925
Laser 810	NEW
KXP830/840	1295/1579

HEWLETT PACKARD

Deskjet 500	398
Deskjet 500C	639
Laserjet IIp+	799
Laserjet IIIP	CALL
Laserjet III	1519
Laserjet IIII	2327
Laserjet IIII	SPECIAL
Paintjet / Paintjet XL	CALL
Paintjet XL 300	NEW
Scamjet 2P	IN-STOCK
Scamjet 2C	1449
Printers	ALL MODELS

IBM

Laserprinter 10-10L	CALL
IBM Execjet	679
BU20 w/feeder	419
BU300 330	449/599

CANON

BJ10EX Bubblejet	319
BJ20 w/feeder	419
BJ300 330	449/599

STAR

NK1020R Color	185
NK2420R Color	305
XB2420 Color	468
Starjet 48	299
LaserPrinter 4	859

QUME

Crystal Express	CALL
-----------------	------

SEIKOSHA

SP 2400	165
LT-20 SL 90+	299/319

CITIZEN

GSX 140+ 145	299/369
PM48 PM48Pro	299/349

QMS

410 Postscript	1499
815 815MR	2869/3905
825 825MR	3359/4625
860	4199
Colorscript 10P	4859
Colorscript 10	5729

TEXAS INSTRUMENTS

Microaser Basic	859
Microaser Basic XL	2149
Microaser PS17+	1179
Microaser PS35+	1469
Microaser XL PS17	2489
Microaser XL PS35	2799

EPSON

FX 850	288
LO 570 870	258/434
DFX 5000	1268
DFX 8000	2138

SEIKO

Smart Label Printer+	139
CH-4104 Color Laser	CALL

LASERJET ACC.

HP Paper/Gusseted Trays	IN-STOCK
Pacific Data 25-pin 1 cartridge	257
Pacific Data memory boards	CALL
Pacific Data Pacific Page XL	CALL
Pacific Data Postscript cart HP III/IIp	289

BATTERY BACKUPS

American Power BK400 desktop	169
American Power AP400 simline	305
American Power AP600 simline	399
American Power AP900 simline	569
American Power Surge Arrest Plus	399
Tripp Lite BC500	179
Tripp Lite BC750	389
Tripp Lite Bar4	449

MODEMS

Cardinal 4400 baud int MNP-5	99
Intel 14.4 internal	109
Intel Satisfaction 100	369
Megahertz modems for all laptops	CALL
Practical Peripherals 9600SA	299
US Robotics Courier 2400 MNP/5	279
WorldPort Fax/Modems for laptops	CALL
Zoom V 42 Bx w/mpp external	125
Zoom V 32 Ext send rec FAX	269

CD-ROM DRIVES

NEC CDR-7 external	599
NEC CDR 84 internal	349
Toshiba	ALL MODELS CALL
Sony CDD-535 internal	349
Sony CDD-720S Laser Library	499

SOFTWARE

Adobe Type Manager	59
Adobe Illustrator 4.0	249
Aldus Pagemaker 4.0	469
Borland Quattro Pro	304
Caere Omnigage	444
Caiera WordScan Plus	649
Caiera Faxgrabber	99
Central Point PC Tools 7.0 1	119
Corel Draw 2.0	359
DrumWin Pro	75
DMA PC Anywhere IV	99
Lotus 1 2 3 ver 3.1 Plus	398
Microsoft Office for Windows	479
Microsoft Windows 3.1	89
Microsoft Word for Windows 2.0	298
Presentation Task Force V4.0	119
Symantec Norton Desktop	95
Stack Elc. Stacker	89
Word Perfect 5.1	269

1000'S OF TITLES IN STOCK!

PLOTTERS & DIGITIZERS

Calcomp 12x12 12x18	297/597
Hewlett Packard Plotters	ALL MODELS CALL
Kurita 12x12 X.P. 12x17 IS-one	249/537
Pacific Data ProTracer	NEW
Summagraphics 12x12 12x18	312/549

TAPE BACKUP

Colorado DJ 10 40 120MB int	195
Colorado DJ 20 120 250MB int	252
Colorado OFA 700 250 700MB int	705
Inwin A120PC 40 120MB int	297
Inwin A250PC 250MB int	297
Maynard XL5540 40MB	349
Maynard VP150	869
Mountain 40MB int ext	249 CALL
Mountain FS8000 int	519

MISC

Keyboards KT AT	69
Logitech Fotoman	NEW
Soundblaster Pro	188

SCANNERS

Complete PC page scanner & Wordscan	559
Logitech Scanman 255 w/perceive	319
Microtek Scanmaker 600G	849
Microtek Scanmaker 600Z	1329

MONITORS

Goldstar 1460+ 14" 1024x768 28mm	299
Itek MF5117 17" 1024x768	1099
Itek MF5217 17" 1024x768 26mm	1049
MAG MX 17F 17" 1280x1024 26mm	CALL
Mitsubishi HL6605 16" 1024x768	959
Mitsubishi HL6945 20" 1280x1024	1785
Nanaco 9080 16" 1280x1024 28mm	1099
Nanaco F550 17" 1280x1024 28mm	1149
Nanaco T560 17" 1280x1024 26mm	1999
NEC 5D 20" multisync 1280x1024	1789
NEC 3FG 15" 1024x768 28mm	CALL
NEC 4FG 15" 1024x768 28mm	749
NEC 5FG 17" 1280x1024 28mm	1349
NEC 6FG 21" 1280x1024 28mm	2399
Packard Bell 8539 14" 640x480 39mm	229
Panasonic C-1381 14" 1024x768	329
Panasonic C-1395 14" 1024x768 int	469
Princeton Ultra 1400	Specia
Samsung ML4571 14" mono VGA	129
Samsung Syncra 17" 1024x768	849
Seiko 1440 1450 14" VGA 25mm	449/549
Seiko 1760 17" 1280x1024 25mm	1249
Seiko 2050 20" 1024x768 31mm	1919
Sony CPD1304S 14" 1024x768 25mm	589
Sony CPD1604S 17" 1024x768 25mm	CALL
Zenith 1492 14" flat-tension VGA	CALL

VIDEO BOARDS

ATI VGA Wonder XL w/mouse 1MB	CALL
ATI 1854 Ultra 1MB	CALL
ATI Vantage 1MB w/mouse	215
ATI Graphics Ultra 1MB w/mouse	429
Boca Basic VGA 640x480	59
Boca SVGA 1024x685 1/2 1MB	129/149
Cardinal 700 1024x768 1/2 1MB	138/159
Diamond Stealth II Color 1MB	265
Hercules Graphics	CALL
Number Nine GV-series	CALL
Ondio Pro Developer II 1MB	219

NETWORKING

3COM 3C503 Ethernet	189
Digiboard	CALL
Lantronic Ethernet Starter Kit	462
Netscape 2.2 user	1099
Netscape 3.11 user	599
Netscape 3.11 110 user	1369
Netscape 3.11 220 user	1889
Netscape 3.11 500 user	2699
Netscape 3.11 1000 user	3660
Netscape 3.11 2500 user	6999
Netscape 3.11 Premium 5 to 250 user	NEW
Netscape Life	69
NE 1000 NE2000 Boards	135/159
SMC Arcnet PC10/270E	98/124
SMC Arcnet PC10/270E	129/200
SMC 3608TP 10BT concentrator	419
Tsara 0111 0105	79/139
Thomas Conrad 6245 Arcnet 16-bit	209
Western Digital Elite Elite16	129/159
Xicom pocketnet adapters	CALL

(Network upgrades available)

FAX MACHINES

Hewlett Packard FAX series	NEW
Panasonic UF312 plain paper	1529
Sharp	ALL MODELS CALL

WHY MIDWEST COMPUTER "WORKS" FOR YOU

WIDE SELECTION

Huge inventory. Thousands of items in stock and ready for immediate shipment!

ON-TIME

In-stock orders are shipped the same day. We are fast & efficient.

RELIABILITY

We earn your business! Over 70% of our orders are repeat customers.

KNOWLEDGEABLE

All of our salespeople are technically trained to provide you with the right solution!

SERVICE

If you don't find it, ask, our friendly staff will special order products for you!

AST PREMIUM EXEC 386SX 20MHz

- 386SX 20MHz 2mb RAM
- Expandable to 8mb RAM
- 1.44mb built-in floppy
- 20mb or 80mb hard drive
- VGA white LCD display
- 1 ser 1 par VGA mouse or keyboard ports
- 6.5 lb. 9"D x 11.4"W x 2.2"H

\$1299

TEXAS INSTRUMENTS TM3000

- 386SX 20MHz 2mb RAM
- Expandable to 8mb RAM
- 1.44mb built-in floppy
- 20mb HD 30 40 60 or 80 opt.
- VGA paperwhite display
- 1 ser 1 par VGA mouse & numeric keypad ports
- 5.7 lb. 8.5"D x 11"W x 1.8"H

CALL FOR PRICE!

NEW! TEXAS INSTRUMENTS TM4000 WinSX/16

- 486SX 16MHz 4mb RAM
- Expandable to 8mb RAM
- 80mb hard drive 3.5" floppy
- NEW brighter VGA display
- 1 ser 1 par VGA mouse & keyboard ports
- Windows 3.1 w/mouse
- 5.6 lb. 8.5"D x 11"W x 1.8"H

\$2549

NEW! TEXAS INSTRUMENTS TM4000 WinSX/25

- 486SX 25MHz 4mb RAM
- Expandable to 8mb RAM
- 120mb hard drive 3.5" floppy
- NEW brighter VGA display
- 1 ser 1 par VGA mouse & keyboard ports
- Windows 3.1 w/mouse
- 5.6 lb. 8.5"D x 11"W x 1.8"H

CALL FOR PRICE!

COMPAQ LTE Lite/25

- 386SL 25MHz 4mb RAM
- Expandable to 10mb RAM
- 1.44mb built-in floppy
- 60 84 or 120mb hard drive
- VGA 5.6" LCD display
- 1 ser 1 par VGA keypad and keyboard ports
- 6.0 lb. 8.5"D x 11"W x 1.75"H

NOW IN STOCK!

QMS



**1 OF THE
NATION'S
LARGEST
TOSHIBA
AUTHORIZED
DEALERS**

WHY SETTLE FOR LESS?

**CDW® SERVICING
YOUR COMPUTER
NEEDS SINCE 1982**

TOSHIBA T3300SL 386SL 25MHz

- ✓ Intel 386™ SL CPU, 25 MHz
- ✓ 2 MB Std., Exp. to 18 MB
- ✓ 80 MB HD 16 msec. Access Time, 1.44 MB, 3.5" Floppy
- ✓ VGA Compatible Display
- ✓ Fluor. Sidelit LCD with 32 Gray Scale / 640 x 480 Res. / Full-Function, Std., Key Spaced, 82-Key Keyboard / Clip for Microsoft® BallPoint™ Mouse
- ✓ VGA Monitor Port / 9-Pin Serial Port / 150-Pin Connector
- ✓ MS-DOS® 5.0 / 5.9 lbs with Battery Pack / Comes with 1 Yr Parts/Labor, with No-Cost Exceptional Care



3300SL 80 MB.....\$2496.25 21001
3300SL 120MB.....\$2754.35 22182

TOSHIBA PERFORMANCE, TOSHIBA QUALITY, TOSHIBA VALUE!



TOSHIBA

TOSHIBA T4400SXC Color

**486SX, 25 MHZ, 80 MB OR
120 MB COLOR TFT LCD!**

- ✓ The World's Most Advanced Color and i486™SX Power in a Notebook PC
- ✓ Intel® 486SX CPU, Running at 25 MHz
- ✓ 8 KB Cache in CPU / Upgradable to i486DX-25 / Color TFT-LCD Active Matrix / 256 Simultaneous "Super VGA" Colors at 640 x 480 Resolution / Port For External VGA Monitor / VGA Compatible with 640 x 480 Pixel Graphics Display / Real Time Clock/Calendar / Full-Function,

Standard Key-Spaced, 82-Key Sculptured Keyboard / MS-DOS® 5.0 Operating System
✓ One Year Parts and Labor With No-Cost Exceptional Care Enrollment During This Period

80 MB Color Active Matrix\$4734.28 CDW 22510

120 MB Color Active Matrix.....\$4992.39 CDW 22434

TOSHIBA T4400SX

**486SX DESKTOP POWER IN A
TOSHIBA NOTEBOOK**

- ✓ Intel486™ SX, Running at 25MHz / 8KB Cache in CPU / Upgradable to 25MHz 80486DX / 150-Pin Exp. Bus Connector / 2 MB RAM Std., Exp. to 18 MB RAM / 80 MB Hard Drive with 19 msec. Access / 1.44 MB 3.5" Floppy / IBM VGA / 640 x 480 / Port For External VGA Monitor / Choice of :Gas Plasma Display, Simultaneous Display, or Page White LCD Display 64 gray Scales, Fluorescent Sidelit Supertwist / Full-Function 82-Key Sculptured Keyboard / Selectable Port For: Parallel Printer, or Tape Back-Up, or 5.25" Diskette Drive / 9-Pin Serial Port / MS-DOS® 5.0 / Weighs Only 7.25 lbs. With Battery Pack / One Year Parts and Labor With No-Cost Exceptional Care Enrollment During This Period



TOSHIBA

80 MB Gas Plasma.....\$3184.25 CDW 21000

80 MB LCD.....\$2927.17 CDW 20999

120 MB Gas Plasma\$3443.48 CDW 22874

120 MB LCD\$3184.25 CDW 22873

CDW®...YOUR TOSHIBA SERVICE AND SUPPORT LEADER

TOSHIBA T6400DX 486DX 33MHz

**FOR POWER USERS WHO
DEMAND A FULLY EQUIPPED
MOBILE PLATFORM.**

- ✓ Toshiba Portable, Requires 120 Volt AC
- ✓ Intel 486DX, Running at 33MHz
- ✓ 8KB Cache in CPU / 4 MB RAM Std., Exp. to 36 MB RAM / 1.44MB, 3.5" / 640 x 480 VGA / Port for Ext. Super VGA Monitor / Full 101-Key Detachable Keyboard / One Full Size 16-Bit ISA Exp. Slot / 9-Pin Serial Port / 150-Pin Exp. Bus Connector / MS-DOS® 5.0 / One Year Parts and Labor with Exceptional Care Enrollment During This Period / Available in 200 MB Gas Plasma or TFT Active Matrix 256 Color Display

200 MB Gas Plasma\$5165.00 21544

200 MB Color.....\$7575.00 21545



TOSHIBA



TOSHIBA T6400SX 486DX 33MHz

**THE IDEAL COMBINATION OF
POWER AND PORTABILITY**

- ✓ Intel486SX, Running at 25 MHz / 8KB Cache in CPU / 4 MB RAM Std., Exp. to 20 MB RAM / 120 MB HD Drive with 12 msec Access / 1.44MB, 3.5" Floppy Drive / IBM VGA Compatible Display System / 640 x 480 / Gas Plasma Display, 16 gray shades or TFT Active Color 256 Matrix Display / Full 101-Key Detachable Keyboard / Full Size 16-Bit ISA Exp. Slot / Super VGA Monitor Port / 9-Pin Serial Port / 150-Pin Exp. Bus Connector / MS-

DOS® 5.0 / One Year Parts and Labor With Exceptional Care Enrollment During This Period

120 MB Color.....\$6585.00 21543

120 MB Gas Plasma\$4175.00 21542

AT CDW® YOU GET MORE COMPUTING FOR YOUR BUCK. CALL NOW!

◆ **CDW® means Service** ◆ **CDW® means Savings** ◆ **CDW® means Business** ◆ **CDW® means Experience**
◆ **CDW® means Technology** ◆ **CDW® means Networking** ◆ **CDW® means Computing** PCM512

**FREE TECHNICAL
SUPPORT FOR CDW®
CUSTOMERS.**

(800) 326-4CDW

WE SELL NAME BRANDS FOR LESS!

©1992 MPK Computing, Inc.

**ALWAYS WORKING TO
KEEP YOUR COMPUTING
ONE STEP AHEAD.**

COMPUTER DISCOUNT WAREHOUSE



US Robotics Sportster
14,400 Fax Modem
High Quality and Performance on a Budget

✓ 9600 bps Group 3 Send/Receive Fax / 14,400 Data
✓ 3200 bps w/ V.42 bis / Data Throughput up to 57,600 bps
✓ Auto-Answer/Auto-Dial / Built-in Speaker w/ext. volume control / 9 LED Status Lights Call Progress Detection / Full 5 Year Warranty / Made in the U.S.A

CDW Price.....\$339.30 CDW 22682

WHY SETTLE FOR LESS?

CDW[®] SERVICING YOUR COMPUTER NEEDS SINCE 1982

Panasonic KX-P4410

Laser Printer

✓ 5 PPM / HP LaserJet Series IIP Compatible / 300 x 300 DPI Resolution / 200-Sheet Multi-Purpose Cassette w/Manual Feed Paper Input / 512K RAM Standard, 4.5 MB Max / 28 Internal Fonts (14 Portrait & 14 Landscape) / Centronics Parallel Interface / EX Set Front Panel w/16 Character LCD



CDW Price.....\$645.20 CDW 21622

HARDWARE, SOFTWARE & PERIPHERALS AT DISCOUNT PRICES

NETWORKING PRODUCTS

NOVELL	
NOVELL Network V2.2, 5-User 5.25"	\$483.70
NOVELL Network V2.2, 10-User 5.25"	1069.52
NOVELL Network V2.2, 50-User 5.25"	1839.10
NOVELL Network V2.2, 100-User 5.25"	2799.33
NOVELL Network V3.11, 5-User 5.25"	819.08
NOVELL Network V3.11, 10-User 5.25"	1397.46
NOVELL Network V3.11, 20-User 5.25"	1899.17
NOVELL Network V3.11, 50-User 5.25"	2749.00
NOVELL Network V3.11, 100-User 5.25"	3667.35
NOVELL Lite	59.00
NOVELL Lite Starter Kits	399.77
NOVELL Lite Add-On Kit	209.63
ETHERNET Interface Connector (NE1000)	129.44
ETHERNET Board (NE2000)	157.06
ETHERNET EISA (NE3200)	687.50

ARTISOFT

ARS-190 AE1/T 10 Base T Adaptor, 8-Bit	\$139.52
ARS-170 AE2/T Ethernet ISA Adaptor, 16-Bit	199.58
ARTISOFT NOS AI Software	59.10
E143 Ethernet Adaptor Kit	199.58
LANtastic Ethernet Starter Kit 4.0	448.31
LANtastic 2Mbps Starter Kit	325.50
LANtastic 10 Base T Starter Kit	589.20
LANtastic 2Mbps Adaptor	129.54
LANtastic for Windows	162.17

CALL FOR ADDITIONAL ARTISOFT PRODUCTS

SMC ACCESSORIES

SMC 3512 TP 12 Node Concentrator	\$709.10
Active Hub 8 Port Coax	219.88
Active Hub 8 Port Twisted Pair	327.58

SMC INTERFACE CARDS

3008 Coax 8-Bit Ethernet	\$98.82
3008 TP 10 Base T 8-Bit Ethernet	106.17
3016 TP 10 Base T 16-Bit Ethernet	166.20
PC 600S Coax Arnetel Fire Server 16-Bit	209.25
PC 650W TP Arnetel Workstation 16-Bit	129.88
PC 650S TP Arnetel Fire Server 16-Bit	209.25
PC 600W Coax Arnetel Workstation 16-Bit	129.88
SMC PC130 8-Bit Arnetel Card	69.60
SMC PC130E 8-Bit Arnetel Card	99.00
SMC PC270 TP Arnetel	109.33
Eisa 3200 Arnetel Twisted Pair	736.08
SMC 8-Bit 10 Base T Ethernet Elite	139.40
SMC Ethernet Plus/A PS/2 Coax Elite	224.10
SMC 16-Bit Ethernet Plus Coax Elite	149.50
SMC 8-Bit Ethernet Plus Coax Elite	109.22
SMC Combo Ethernet TP, Coax, AUI Elite	187.57

3Com

3COM 3C503 TP 10 Base T	\$229.88
3COM 3C507 Ethernet Card	281.61
3COM 3C503 Etherlink	168.24
3COM Ethernet Repeater	848.31

THOMAS & DONALD

6242 Arnetel 8-Bit	\$69.20
6245 Arnetel 16-Bit	179.31
6246 Twisted Pair Plus Ethernet	229.07
6246 PS/2 Board Arnetel	228.18
6151-11 16 Port Smart Hub	709.01
4045 16/4 Token Ring XT/AT	519.23

XIRCOM

Arnetel Pocket Adaptor Coax	\$237.50
Arnetel Pocket Adaptor RJ45	239.77
Ethernet Pocket Adaptor Thin Coax	329.55
Ethernet Pocket Adaptor 10 Base T	329.55

NETWORKING SOFTWARE

IBM TOKEN RING	
IBM 16/4 PS/2 MCA	\$609.11
IBM 16/4 XT/AT	609.11
IBM 16/4 Multi Access Unit MAU	439.00
INTEL NETWORKING	
INTEL Token Express EISA 16/4	\$648.88
INTEL Token Express 16-Bit Coax	123.53
INTEL Token Express 16-Bit TP	134.33
INTEL Token Express XT AT 16-A	509.23
INTEL Token Express EISA 32-Bit	599.30
BORLAND dBase IV LAN Pak	\$426.37
BORLAND Quattro Pro Network Node	244.30
CC Mail Products	CALL
FIFTH GENERATION Direct Access Network	344.57
HARVARD GRAPHICS LAN Pack	CALL
LOTUS 1-2-3 2.4 Server	558.86
LOTUS 1-2-3 2.4 Network Node	339.47
LOTUS 1-2-3 3.1 Server	629.54
LOTUS 1-2-3 3.1 Network Node	428.16
MICROSOFT Word 5.5 Network Node	185.39
MICROSOFT Excel Network Nodes	249.11



WORD PERFECT Office 5.0 User V.3.01 278.79
WORD PERFECT Office 200K V.3.01 923.08

TAPE, REMOVABLE & FLOPPY DRIVES

MEGA

IOmega Tape 250 250MB Tape Backup	\$246.59
IOmega Bernoulli PC Powered 90/Pro	\$38.12/249.57
IOmega Bernoulli Transportable 90 Pro	798.88
IOmega Bernoulli Insider 90 Pro	779.28
IOmega Bernoulli External Dual 90 Pro	1589.89

COLORADO

COLORADO Jumbo 120/Jumbo 250	\$189.37/263.58
COLORADO OFA700	724.92

SYDOS

SYDOS Puma 44MB Ext.	363.93
SYDOS Puma 88MB Ext.	479.92

Call For Accessories And Interfaces

Mountain

MOUNTAIN 120MB Internal Tape Drive	\$239.80
MOUNTAIN 120MB External Tape Drive	449.90
MOUNTAIN 250MB Internal Backup	474.42
MOUNTAIN 304MB Internal IDE Backup	419.50
MOUNTAIN 250MB External Backup	599.22
MOUNTAIN 2.0 Gigabyte External Filesafe	2999.20

Call For PS/2 Drives, Controllers, Accessory Kits and Tapes

IRWIN

IRWIN A120PC-120 MB Internal	\$219.19
IRWIN A250PC-250 MB Internal	279.89
IRWIN A120E-120 MB High Speed External	289.13
IRWIN A250E-250 MB High Speed External	346.68

Call For Controllers, Accessory Kits and Tapes

SUMMIT

SUMMIT 120MB Int.	\$165.39
SUMMIT 250MB Int.	229.34
SUMMIT 305MB Internal IDE 12MB/min	299.90

MICROSOLUTIONS

MICROSOLUTIONS Ext. 100MB HD	\$499.06
MICROSOLUTIONS Backup Ext. Floppy 3.5"	189.41
MICROSOLUTIONS Backup Ext. Floppy 5.25"	189.41
MICROSOLUTIONS Ext. 40MB Tape Backup	378.50
MICROSOLUTIONS Ext. 40MB	

CD-ROM & OPTICAL DRIVES

HITACHI 3000/3600	\$409.30/\$419.30
HITACHI 1700S External	267.42
MAGNAVOX 48TIS Ext. w/CD Bundle	398.70
MAGNAVOX Int. MPC CD-ROM	329.00
NEC CDR 37 External Portable	379.40
NEC CDR 74 External	556.77
NEC CDR 84 Internal	499.15
PANASONIC LF5010 Worm External	208.91
PANASONIC LF7010 Ext. 1 Gb Erasable Optical	2579.20
SONY CDU-7205N External CD-ROM	444.78
SONY CDU-535 Internal CD-ROM	299.10
SONY CDU-54101 Internal SCSI CD-ROM	418.32
SONY SMO-S501 650MB Erasable Optical	2595.42
TOSHIBA 3301 External	329.00
TOSHIBA 4301 Internal	539.32

CD ROM SOFTWARE

BRITANNICA Family Classic	\$69.52
BRODERBUND Carmen San Diego Deluxe CD	\$3.10
CD-ROM Software 5 CD's Bundle, Call For Titles	129.62
COMPTON'S Family Encyclopedia	329.33
COREL SYSTEMS Draw CD	449.29
COREL SYSTEMS Artshow	179.25
INTERPLAY Battle Chess	49.20
LOTUS 1-2-3 for Windows w/Smart Help	CALL
MACROMED Clip Media For Windows	299.50
MICROSOFT Bookshelf 9th For Windows CD	65.50
MICROSOFT Multimedia Dev. Kit Windows	355.40
MICROSOFT Programmer's Library	283.75
MICROSOFT Works For Windows CD	139.20
NEC Clip Art 3D	256.62
NEC Image Gallery	266.05
PASSPORT Media Music	69.22
RTM Complete Audition	65.15
RTM National Geographic Mammals CD	129.17
RTM Great Cities of the World I	79.07
RTM Great Cities of the World II	79.07
RTM Time Magazine Compact Almanac	119.30
SIERRA-ON-LINE Kings Quest V	49.20
SIERRA-ON-LINE Space Quest IV	49.20

If You Don't See The Title You're Looking For, Call A CDW Rep.!!

PLOTTERS, DIGITIZERS & SCANNERS

CALCOMP 12 x 12 w/16 Bit	CALL
CALCOMP 12 x 18 w/16 Bit	CALL
CALCOMP 2024/2036 Pacesetter	CALL
CALCOMP Design Mate 3024	CALL

HURTA

KURTA 12 x 12 XLP/12 x 18 XLP	\$234.50/\$499.29
KURTA 12 x 17	538.27

Summagraphics

Summagraphics Summa II 12 x 12	\$289.60
Summagraphics Summa II 12 x 18	509.60
COMPLETE PC Full Page Scanner	526.66
EPSON ES300C Color Scanner	838.11

HOUSTON INSTRUMENT

HOUSTON INSTRUMENTS DMP-181	\$2795.42
HOUSTON INSTRUMENTS DMP-182	3495.40

HEWLETT PACKARD

HP7575 DXL/HP7575A EXL	\$3098.88/\$3967.25
HP7475A/HP7550B	1309.25/2999.70
HP SCANJET IIP/HP7570A	849.10/2529.38
HP SCANJET II C Color XT/AT	1449.10

CAD MONITORS & CARDS

HERCULES Graphics Station Gold 18	\$433.33
MITSUBISHI HL8945 ATKL 19"	1798.91
MITSUBISHI HL8915ATKL	1959.77
ATI Graphics Ultra 1MB	435.41
ATI 8514 Ultra 1 MB	379.77
NANO 17" F550i 28mm/1280 x 1024	1199.40

SOFTWARE

ACT Software 2.1	\$99.90
AUTODESK AutoSketch	142.69
BANNER BLUE Orig. Plus Advanced	82.30
BORLAND dBase IV	459.10
BORLAND Reflex	157.95
BORLAND Sidekick V2.0	54.67
BORLAND Turbo C++	64.75
BORLAND Turbo Pascal	93.60
BORLAND C++ V3.0	298.17
BORLAND Paradox V3.5	428.98
BORLAND Quattro Comp Upgrade	99.78
BORLAND Quattro Pro 4.0	289.95
CENTRAL POINT PC Tools V7.1/Win Virus	35.10
CLARION Professional Developer	433.33
DAC Easy Accounting 4.2	85.33
DAC Easy Bonus 4.2	129.31
FIFTH GENERATION Macro Util. 1990	89.20
FIFTH GENERATION Fastback 3.0	116.08
FIFTH GENERATION Direct Access	63.77
FORM TOOL 3.0	57.90
FOXBASE Foxpro 2.0	439.99
GEOWORKS Ensemble	118.42
IBM OS/2 V2.0 Standard Edition	129.77
INTUIT Quicken 5.0	43.79
LAN Spool 286/386	257.10/368.21
LOTUS 1-2-3 V2.4	319.95
LOTUS 1-2-3 V3.1 Plus	385.50
LOTUS Agenda V2.0	125.91
LOTUS Double Up Upgrade	137.00
LOTUS for Windows	389.90
LOTUS Freelance Graphics	339.78
LOTUS Magellan	65.95
LOTUS Symphony	465.59
LOTUS Upgrades	CALL
MICROCOM Carbon Copy V6.0	109.37
MICROSOFT C Compiler 6.0	298.60
MICROSOFT C Compiler 7.0 Upgrade	134.50
MICROSOFT DOS 5.0 Upgrade	99.99
MICROSOFT Flight Simulator 4.0	39.50
MICROSOFT Fortran Compiler 5.0	274.44
MICROSOFT Quick Basic Compiler 4.5	84.75
MICROSOFT Upgrades	CALL
MICROSOFT Visual Basic	119.20
MICROSOFT Word V5	199.50
MULTISORT PC Quick Power Pack	58.88
POWER UPI Calendar Creator Plus	49.80
PROCOMM Plus	63.87
QUARTERDECK Desqview 386 V2.4	129.86
QUARTERDECK OEMM 386 Manager	59.90
QUARTERDECK ORAM & Manifest	49.30
QUARTERDECK Desqview	72.10
QUALITAS 386 Max 5.0	84.19
SOFTWARE PUB PFS Write	154.30
SOFTWARE PUB Harvard Graphics V3.0	267.88
STACKER SOFTWARE	79.95
STACKER Software And Board For AT 16 Bit	168.99
SYMMANTEC NORTON Advanced Utilities V6.0	108.90
TRAVELING SOFTWARE Laplink Pro	95.58
WORDPERFECT 5.1 5.25" or 3.5"	257.96
WORDPERFECT LetterPerfect	84.11
XEROX Ventura Software Version 3.0	493.44

FAX, SOUND & ACCESSORIES

ATI Stereo FX Sound Card	139.78
BROWN-WAGH Sound Blaster	112.80
BROWN-WAGH Sound Blaster Professional	189.28
COMPLETE PC Communicator	299.56
COMPLETE PC Portable Fax	299.56
INTELLICOM Long Link	117.70
KEYTRONICS 101+	93.50
PACIFIC DATA Connect 1 25MB	332.58
CompleteFax 9600	399.50

AT CDW[®] YOU GET MORE COMPUTING FOR YOUR BUCK. CALL NOW!

♦ **CDW[®]** means Service ♦ **CDW[®]** means Savings ♦ **CDW[®]** means Business ♦ **CDW[®]** means Experience
♦ **CDW[®]** means Technology ♦ **CDW[®]** means Networking ♦ **CDW[®]** means Computing

FREE TECHNICAL SUPPORT FOR CDW[®] CUSTOMERS.

(800) 326-4CDW
WE SELL NAME BRANDS FOR LESS!

©1992 MPK Computing, Inc.

ALWAYS WORKING TO KEEP YOUR COMPUTING ONE STEP AHEAD

COMPUTER DISCOUNT WAREHOUSE™

ATI GRAPHICS ULTRA 1MB

✓ Install an ATI GRAPHICS Accelerator and Transform Your Computer Into a Graphics Workstation! ✓ Watch Your 80386 Out-perform Faster 80486 Computers with the Addition of an ATI Graphics Accelerator ✓ True 1280 x 1024 Windows Support; 76 Hz Refresh at 1024 x 768 / Crystal Fonts Provide the Equivalent of 3200 x 2400 Resolution on 1024 x 768 Monitors / Includes Microsoft Compatible Input Mouse / Superior Graphics Performance



WHY PAY RETAIL?

CDW® Sells For Less

AND SERVICES YOU BETTER

CDW® Price **\$339.56** CDW 19918



HARDWARE, SOFTWARE & PERIPHERALS AT DISCOUNT PRICES

COMPUTERS

AST

AST Exec 386SX/25, 60, 4MB, Mono/Color, \$1422/2549
AST Exec 386SX/25, 60, 4MB, Mono/Color, 1886/2725
AST Exec 386SX/25, 120, 4MB, Mono/Color, 1846/2968
AST Exec 386SX/25 Notebook 4063, 1272, 73/348.31
AST Power Premium 486SX/450, 4MB, VGA, 1 Pkg, 1782.50
AST Power Premium 386SX/333, 4MB, VGA, 1 Pkg, 1882.50
AST Power Premium 386SX/333, 4MB, VGA, 1 Pkg, 1882.50
AST Premium Tower 486SX/450, 4MB, VGA, 1 Pkg, 3042.39
AST Advantage 386SX/20, 4MB, 2 Pkg, DOS, 1012.89
AST Bravo 4/33, 2MB, 1 Floppy, VGA, DOS, 1322.22
AST Bravo 3/25, 2MB, 1 Floppy, VGA, DOS, 739.56

TOSHIBA

3300SX, 25MHz, 2MB, 80/10/20 5.0 LBS., \$2496.25/2754.35
4400SX, 25MHz, 4MB, 80HD, LCD 2827.17, GP 31M/25 Color 4704.28
4400SX, 25MHz, 4MB, 120HD, LCD 31M/25, GP 34M/48 Color 4982.38
4400SX, 25MHz, 4MB, 120HD, GP 4175.00 Color 6585.00
6400SX, 33MHz, 4MB, 20HD, 60/165.00, Color, 7575.00

DTK

36620 SX, No HD, 4MB, VGA, 2 Pkg/2HC, \$841.18 / \$988.24
36620 SX, No HD, 4MB, VGA, 2 Pkg/2HC, 1065.58 / 1430.59
48620 SX, No HD, 8MB, VGA, 2 Pkg/2HC, 1262.60 / 2217.61
48620 SX, No HD, 8MB, VGA, 2 Pkg/2HC, 1571.76 / 2126.41

NEC

ULTRALITE SL20 120 MB Notebook, \$2056.35
ULTRALITE SL25 60 MB Notebook, \$2539.49
NEC 386SX/25 2MB Super-VGA 1 Drive, 1419.08
NEC 386SX/33 4MB Super-VGA 1 Drive, 1348.06
NEC 486SX/33 4MB Super-VGA 1 Drive, 1659.44
NEC 486/50, 1987.80

COMPAQ

Proline Desktop 3/25/25 64MB, 2MB, SVGA, \$366.91
Proline Desktop 3/25/25 120MB, 2MB, SVGA, 1146.07
Proline Desktop 4/33/33 32MB, 4MB, SVGA, 1772.53
Centura Notebook 3/25/25 64MB, 2MB, VGA, 1865.93
Centura Notebook 3/25/25 120MB, 4MB, VGA, 2322.97
LE Lite 3/25MHz 64MB, 2MB, 120HD, 2560.61/2652.17
DP386/50 MD 11, 1539.11, CP048/33M MD 1, 2483.70

ALR

ALR PC Flyer 386SX/25, 1MB, 1 Floppy, 60MB HD, \$889.17
ALR Business Vase 486/33, 101, 1898.10

CALL FOR THE LATEST MODELS FROM ALR

TEXAS INSTRUMENTS

TM 4000 WIN DX2+ 120HD, 4MB, GA Fast, \$3559.78
TI TM4000 WIN SX16 80HD, VGA, Fast, \$2619.22
TI TM4000 WIN SX25 120HD, 4MB, VGA, Fast, 3007.01
TI 3000 SX Notebook 60MB, 2065.62
TI 3000 SX Notebook 80/120MB, 2280.30/2564.50
TM 3000 WIN SX 60MB/80MB, 2259.44 / 2395.65
TM 3000 WIN SX 120MB, 2795.78

PACKARD BELL

Force SX16N 85 MB HD 2MB VGA Mouse \$668.00
Force45 486/33, 130 MB, 4 MB, Modem, 1759.00
Force45 486SX/20 107MB HD 2MB VGA Modem, 1029.00

KINGSTON MEMORY

2MB/4MB Memory Board CPO Lite 2668/149/20/239.25
2MB/4MB Memory Board CPO Lite, 179.12/449.50
4MB Module CPO - 386, 206/25E, 359.20
1MB/4MB AST Cupid Simms, 86.93/189.17
AST Exec 386SX/4 4MB Module, 186.17
2MB/4MB Upgrade HP LaserJet II J10 120/181/69.23
1MB/2MB Upgrade HP LaserJet II P 101/78/40/118.72
1MB OKI Laser 400, 96.50
2MB OKI Laser 400, 96.50
AST SX/PC 286 OK, 96.60

KINGSTON FOR TOSHIBA

4MB 2200SX, \$249.15 2MB 3200SX, \$179.47
8MB 4400SX, \$599.57 4MB 3400SX, \$599.57
4MB 4400SX, \$329.86 4MB 3400, \$329.86
2MB 3300SX, 189.19 4MB 3300SX, 299.57

BOARD & COMM PRODUCTS

AST 286 11, Enhanced Local, \$499.10
BOCA 2 Ser II Par Port, 39.67
SOUND BLASTER PRO, 188.28
KINGS OK SX Now, 20 MHz, 1MB, 50, 502, 249.50
KINGS OK SX Now, 20 MHz, 1MB, 50, 502, 249.50
KINGS OK SX Now, 20 MHz, 1MB, 50, 502, 249.50
KINGS OK SX Now, 20 MHz, 1MB, 50, 502, 249.50
KINGS OK SX Now, 20 MHz, 1MB, 50, 502, 249.50
KINGS OK SX Now, 20 MHz, 1MB, 50, 502, 249.50

MOST ORDERS RECEIVED BY 5:00 P.M. C.D.T. SHIP SAME DAY

DOT MATRIX & LASER PRINTERS

EPSON

LX810, \$155.00 F X850, \$289.00
LQ870, \$355.00 EPL 7500 Laser PS1888.99
LQ2550, \$55.27 LQ1170, \$99.27
F10150, \$89.00 LQ570, \$254.40
Action Laser II GPPM 689.50 LQ1070, \$374.20
DFX 5000, 1278.00 DX-K 8000, 2147.00
EPL 8000 Laser, 1299.04
EPSON AP3250, 216.13

NEC

Sterner II 95, \$1379.33 P3000, \$906.06
P3000 24 pin, \$99.92 P3000 24-pin, 222.11
P3000 24-pin, \$22.58 P9000, \$69.21

DICOMINX by KODAK

701 Parallel, \$379.40
180 St Parallel/180 St Serial, 298.28 / 307.74

OKIDATA

ML184 Turbo, \$219.33 ML390+, \$439.22
OL400, \$99.00 ML391+, \$596.41
OL400, \$99.19 ML390, \$399.00
OL830, \$129.41 ML393+, \$919.20
OL840, \$159.62 ML393+ Color, \$999.50
ML320, \$96.29 ML321, \$439.44

Panasonic

1124 I, \$284.25 1624, \$339.93
1123, \$199.47 1180, \$148.99
4430 Laser, \$99.92 2123, \$244.09
1654, \$399.86 4450 Laser, 1099.12
4410 Laser Printer, \$45 Laser PostScript CALL / 1749.78

TECIS INSTRUMENTS

TI MicroLaser PS17 P335, \$1179.00/1469.00
TI MicroLaser Basic 8, \$68.17

HEWLETT PACKARD

Co-Star Label Writer, \$179.31
H-P LaserJet Model II, \$229.22
H-P Deskjet 500/45 P LaserJet IIP Plus, \$396.50/191.00
H-P LaserJet II, \$1529.00 H-P LaserJet II XL, CALL
H-P PaintJet/PaintJet 300, \$799.00/400.00
H-P Deskjet 500, \$699.00
H-P LaserJet IIP, \$1029.00
CANON BJ10EX/BJ20 Bubble Jet, \$366.40/323.68
QMS PS410, 1499.01
PACIFIC DATA 25 in 1 Cent. LAB3, 259.00
PACIFIC DATA 75 in 1 for Deskjet, 99.50
PACIFIC DATA Page Postscript 4 HP LAB3, 329.41
PACIFIC DATA 1 MB for 2P II/III/IV, 106.48
SEIKO Postscript Color Laser, \$499.90
POSTSCRIPT CART, W/2MB HP LAS2, 299.44
CITIZEN GSX 140 Plus, 299.44
CITIZEN PM48 Notebook Pk, 319.20
CPI JETMEMORY 1MB for HP/II/III/IV, 96.80
CPI JETPAGE for HP II/III/IV Postscript, 208.72

DRIVES, TAPES & CARDS

PLUS Hardcard IXL 105MB, \$419.20
PLUS Hardcard IXL 50 MB, 249.07
MAXTOR 130 MB IDE, 339.50
MAXTOR 340 MB IDE 13MS, 829.22

Seagate

ST1230A, \$599.92 SEAGATE ST-2511, \$228.41
ST3120A, 105MB, 288.47/517686, 786 MB, 1389.08
ST4120N/105MB, 189.32 ST351 AX, 199.82
ST3144A, 130MB, IDE, 16MS, 338.22
ST1239A 211 MB IDE, \$588.52

MICROPOLIS

1884-7 340 MB, \$1896.29
1884-7 345MB HH, \$779.44
1528-15 476MB ESDI, 1969.32

CONNER

CONNER 40 MB / 120 MB, \$199.00/\$329.24
CONNER 84 MB, 209 MB, 278.51/548.63
CONNER 174MB/510MB, 439.10/1199.10

WYSE TERMINALS

WYSE 50 Amber or Green, \$346.15
WYSE 60 Amber or Green, 279.92
WYSE 160/50 Amber or Green, \$596.27/49.45
WYSE 165 VT220 Amber, Green, or White, 345.55
WYSE 150 Amber, Green or White, 250.45
WYSE 305 Color, \$45.40
WYSE 305S Color, 569.39

MODEMS & COMMUNICATIONS

Robotics

16 B/14 C Courier Dual Std Extw Fax \$709 65/799.46
14 C Courier V.32 bis Ext Int, 509 05/459.11
16 B HST Courier Ext, 499.10
14 C Sportster w/Fax External/Internal, 339 30/319.30
9600 Sportster w/Fax External/Internal, 308 44/275.22
14 C Sportster External/Internal, 308 30/275.30
2400 Sportster External V.42, 153.40
9600 V.32 Worldport External w/Fax, 359 56/439.73

HAYES

ULTRA 144 V.32 External, \$639.39
HAYES OPTIMA 9600 V.32/Fax96, 339.50/366.00
ULTRA 9600 External, 578.00
HAYES OPTIMA 2300 - Fax96, 123.34/155.10
HAYES Focket Edition, 109.92

PRACTICAL PERIPHERALS

14 400 V.32 BIS Std Rev FAX External, \$379.50
14 400 V.32 BIS Std Rev FAX Internal, 339.10
9600 V.32 Ext, 299.10 9600 V.32 Int, 259.23
2400 V.42 Int, 109.10 2400 V.42 BIS Ext, 119.55
2400 Int, 74.95 2400SA, 95.65
Pocket 2400, 96.00 2400 Ext. FAX Modem, 98.50
2400 Internal Fax Modem, 89.50

Intel

14.4 External, \$439.00
2400B V.42, 138.37 2400 External V.42, 149.88
2400 External, 163.94
INTEL SafeFAXion Model 100/200, 96.50/284.10
INTEL SafeFAXion Model 400/400E, 379.04/428.50

MULTI-TECH

MULTI-TECH MT9328A 9600, \$447.62
MULTI-TECH 14.4 Ext Fax/Modem V.32 BIS, 316.11
MULTI-TECH MT224 BA, 278.98
MULTI-TECH MT698EA, 496.10

MATH COPROCESSORS

INTEL Overdrive 486SX/25MHz 720 MHz, \$559.20/444.44
INTEL 387DX 1620/2533, 195.25
INTEL 387SX 1620/25, 79.88
INTEL 287LX/287XL, 770.00/78.00
INTEL 487SX/387SL Mobile, 454.44/79.88
INTEL Rapid CAD For All 386 DX's, 239.10
CYRIX FastMath SX16-20/25, 73.13
CYRIX FastMath DX16 25MHz, 89.89
CYRIX FastMath 287 8 20MHz, 79.40
CYRIX FastMath DX33 33MHz DX40 40MHz, 99.50/115.06
CYRIX SX DX Bundle w/Quattro Pro 3.0, 199.68

BATTERY BACKUP AND UPS

Smart1250, \$747.87 BACK UPS 900, \$379.98
Smart 400, \$307.95 Smart 600, 399.10
BACK UPS 250, 100.25 Smart 800, 555.55
BACK UPS 400 450/600, 159.25/199.88/259.84
Smart 2000, 1158.60

AMERICAN

BC-250, \$99.30 BC-400, 195.10
BC-500, 179.55 BC-500 LAN, 189.77
BC-600 LAN, 258.13 BC-800 LAN, 348.61
BC-1250 LAN, 489.10 OMNI 450 LAN, 259.17
OMNI 600 LAN, 348.89 OMNI 800 LAN, 495.50

MICE

ZNIX Super Mouse II W/Windows 3.1, 999.75
LOGITECH Fitman, 499.30
LOGITECH Mouseman Ser. or Bus w/Win 3.1 65.35/115.30
LOGITECH Mouseman Cordless, 53.33
LOGITECH ScanMan 32/Scanman 256, 129.65/289.26
LOGITECH Trackman Serial/Portable, 59.35/65.50
MICROSOFT Mouse Bus or Serial/No Bk. \$5.50/79.80
MICROSOFT Mouse w/Windows 3.1, 144.96
MICROSOFT Ball Point Mouse, 118.50
MICROSOFT Mouse, No Software, 79.80

WINDOWS SOFTWARE

MICROSOFT Windows 3.1, \$89.95
MICROSOFT Windows Upgrade 3.1, 48.95
MICROSOFT Win 3.1 After Dark Bundle, 105.50
MICROSOFT Office, 439.69
MICROSOFT Publisher, 119.20
MICROSOFT Excel for Windows 4.0, 289.25
MICROSOFT C Compiler for Windows, 299.12
MICROSOFT Project for Windows, 409.10
MICROSOFT Windows 3.1 Drive opens Kit, 219.47
MICROSOFT Word for Windows, 289.25
MICROSOFT Works for Windows, 119.20
ADOBE TypeManager for Windows, 58.97
ALDIS PageMaker, 497.58
ATECH Windows Powerpack, 42.50
BERKLEY After Dark for Windows, 29.20
BORLAND Object Vision 2.0, 95.08
BORLAND Turbo C++ For Windows, 79.90
CAERE Onimage Professional, 558.42
CALERA Wordscan+ for Windows, 398.42
Carbon Copy for Windows, 108.37
COREL SYSTEMS Corel Draw 3.0, 369.99
CROSSTALK for Windows, 119.85
DELIRIA Win Fax Pro, 89.95
INTUIT Quicken for Windows, 119.85
LOTUS 123 For Windows, 339.50
LOTUS Ami Professional for Windows 3.0, 239.09
LOTUS Freelance, 336.30
LOTUS SmartSuite for Windows, 455.24
LOTUS SmartPlus, 123.23
MICROGRAF X Designer 3.1 for Windows, 379.42
SOFTWARE PLUS Windows Superpack 4 for Windows, 439.33
SYMANTEC NORTON Desktop, or Windows, 83.33
SYMANTEC NORTON Backup for Windows, 83.33
SYMANTEC On Target, 258.17
SYMANTEC PC Anywhere IV, 108.95
WORDPERFECT for Windows, 263.33
WORDPERFECT for Windows Upgrade, 75.85
XEROX Ventura Gold for Windows, 489.30

VIDEO PRODUCTS

SAMSUNG 12" Amber Mono, \$84.10
SAMSUNG 14" White Mono, 99.88

VGA & SUPER VGA MONITORS

MAGNAVOX Super VGA 1024 x 768, 39mm, \$259.24
MAGNAVOX Super VGA 25mm 7CM9086, 306.00
MAGNAVOX CM9039 39mm VGA Color, 228.20
MAGNAVOX CM749 Micro 14" VGA, 119.50
Magnevox 17" CM9217, 31mm, 657.14
MAGNAVOX 20 CM945, 23 inch, 1299.00
NEC Multisync 380X4FG, \$119.80 / 739.50
NEC Multisync 50, 1529.18
NEC Multisync 5FG/FG, 1329.50/2298.67
NEC Multisync 2A, 379.12
PACKARD BELL 39mm VGA Color, 229.57
NANAO 17" 1280 x 1024 .28 mm FST, 1228.78
PANASONIC C1381 1024 x 768 14", 339.78
SAMSUNG 14" White VGA, 119.50
SAMSUNG CSA 7571, 17, 789.50
SONY 1200 / 1304S, 338.50 / 689.80
SONY 1604S, 17, 25mm, 965.14
SONY 1905, 20", 25mm, 2349.50
ZENITH Z-1492, 507.08

VGA & SUPER VGA DISPLAY CARDS

ATI BASIC 16 VGA, 59.18
ATI GRAPHICS ULTRA 1 MB, 339.56
ATI INTEGRA, 79.38
ATI 8514 ULTRA 1MB, 379.77
ATI VANTAGE 1MB, 215.24
ATI VGA Wonder XL 1 MB, 143.23
BOCA Basic VGA, 54.50
DIAMOND Speedstar Stealth, 259.44
HERCULES Graphics Station Gold 24 + 2, 449.50
ORCHID Prodesigner IIS 1 MB, 148.48
ORCHID Fahrenheit 1280, 1MB, 272.73
PARADISE 1024/256K, 145.63
PARADISE VGA, 106.54
ORCHID Fahrenheit 1280, 1MB, 272.73
VIDEO 7 Win VGA 1MB, 144.22
VIDEO 7 VRAM II Ergo, VGA 1MB, 248.28

CDW EXTENDED HOURS
7:30-7:30 CDT Mon-Fri
7:30-7:30 CDT Sat-Sun
Tech Support 8:00-7:00 CDT Mon-Fri



WHY WAIT? CALL COMPUTER DISCOUNT WAREHOUSE™ NOW!
WE SELL NAME BRAND ITEMS FOR LESS!
(800) 326-4CDW

In Illinois FAX
(708) 498-1426 (708) 291-1737

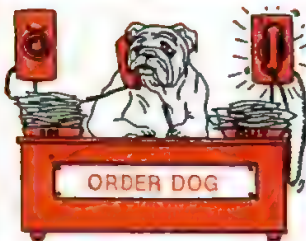


COMPUTER DISCOUNT WAREHOUSE
SERVICING YOUR PC NEED
SINCE 1981 - DON'T ACCEPT ANY
SUBSTITUTES

Apply for the CDW® Credit Card
High Volume Bids Invited

Credit Card charges are not subject to any limit of amount. Shipping and handling charges apply. On all order ship orders under \$500.00 please call CDW handling fee. Non-cash orders subject to a 3.0% handling fee. All prices include 3% discount for cash. Allow 10 business days for shipping when paying by personal check. Estimates, prices and other information are subject to change. All prices subject to change. © 1992 MPK Computing, Inc.

©1992 MPK Computing, Inc.



After 9 years, We're Still Doggedly
Determined to Give the Best Doggone
Service and Prices to PC Users!

1-800-438-6039

Network

3COM	
3C503 Etherlink II 5-pack	100/790
3C503TP 10 Base T	229
3C505B Etherlink Plus	579
3C507 Etherlink 16	279
3C523 MCA Etherlink	260
ARTISOFT	
Starter Kit 2mbps/AE2	325/459
Starter KitAE3	539
LAN Card 2mbps/AE2	129/199
LAN Card AE3	229
Central Station	419
NOVELL	
NetWare 1.11/11.11 User Kit	69/399
NetWare 2.2 5/10 User	479/1099
NetWare 3.11 250 user	1899
NetWare 3.11 250 User	1899/3648
NetWare 3.11-10 User	1375
NE1000/NE2000	129/155
NE 3200	869
Access Server	1595
SMC	
PC190/PC130E	75/99
PC800WS/PC800FS	129/209
HUB 8-Active/4-Passive	249/89
Ethercard 8 bit/16 bit	149/169
Token Card 8 bit/16 bit	349/399
10 Base-T Card 8 bit/16 bit	185/205
3608TP 10BT concentrator	409
3106 16 bit Ethernet 10BT coax	159
3512TP Ether.10BT conc. 12 port	709
THOMAS RAD	
TC4045 16/4 Token Ring	499
TC8151-11 16 port smart hub	679
TC8242/TC8242-TP	69/99
TC8245/TC8245-TP	199/219
TC8045/TC8045-TP	199/219

Network Software

Borland D Base IV LAN-1 user	249
Borland Quatro Pro V.4.0 networkable	319
Close-Up Lan Zuser/8 user	249/479
FoxPro Lan 6 user	539
Lotus 2.4 server/node	559/339
Lotus 3.1 server/node	625/409
Norton PC Anywhere V.4.5	119
Norton PC Anywhere V.4.5 Lan	325
Peachtree Network Accounting	489
Procomm Plus Network 5 pack	325
Unouchable Network	429
Word Perfect Office 5 user	289
Wordstar 2000 LAN-9 pack	259
X Tree Virus Safe Lan	379
X Tree Net/for Unix	319/189

Software

Aldus Pagemaker	499
Carbon Copy/Close Up	110/109
Clarion ProDeveloper	449
Clipper 5.0	489
Corel Draw	385
DBase IV 1.5	389
Desqview 386	129
Foxbase/FoxPro	195/449
Freelance Plus	309
Harvard Graphics	359
Lotus 2.4/3.1 Plus	345/379
Lotus Symphony	469
Lotus for Windows	415
Smart Suite/Upgrade	449/339
Microsoft Windows 3.1/Word	89/219
Microsoft Word for Windows	319
Microsoft Excel for Windows	299
Norton Desktop for Windows	94
Norton Utilities 6.0	115
Norton AntiVirus	85
Peachtree III Complete 40Q	189
Paradox	call
Q&A 4.0	219
Quattro Pro	299
Ventura Desktop Publishing	479
Word Perfect 5.1	255
Word Perfect for Windows	259
Wordstar 7.0/2000+	259/225

Chips

INTEL 387-33	95
387-SX16/20	89
CYRIX SX16/20/25	77
SX33	95
DX33/40	95/125

Notebooks

TEXAS INSTRUMENTS	
3000-80/80/120	2025/2195/2589
3000 Win SX-80/80	1995/2339
3000 Win SX/120	2899
TM4000 Win 4MB	
SX/16 w/ 80MB HD	2495
SX/25 w/ 120MB HD	2999
DX/25 w/ 120MB HD	3325
LIBREX	
SX/20 + 4 MB w/40HD	1250
SX/20 + 4 MB w/60HD	1325
SX/20 + 4 MB w/80HD	1450
AST 386SX-20	
43V + w/ 40MB +2MB	1995
63V + w/ 60MB +2MB	2299
NEC	
Ultralite SX20 w/ 80	2539
Ultralite SX20 w/ 80	2599
Ultralite SX25 color w/ 80	4999
EPSON	
NE8L-20/25	1525/1775
w/ 60/80/120 MB HD	389/542/758

Monitors

NEC MULTISYNC	
3FGX/4FG	689/769
PANASONIC	
136/1/1395	329/439
199/1-20" 1280x1024	1559
SAMSUNG	
Fast White ML4571	119
CVB 4995 Syncmaster 2E	269
CVM 4987 Syncmaster 3E	299
CTX	
5466/5468NI	289/329
3436 Multiscan 28	399
1760 17" VGA.28	815
5430/5432	229/275
NANAO	
9070U/9080U	889/1025
550U/560U	1149/1899
VIEWSONIC	
7/6/6SF	1099/269/529

Video Cards

ATI	
VGA Integra 512K	89
Graphics Vantage 1mb	349
Graphics Ultra w/ 1MB	459
8514 Ultra Plus w/ 1MB	389
VGA Wonder XL w/ 1mb	189
BOCA	
Basic VGA/Super VGA	63/129
CARDINAL	
VGA 700/732 w/1MB	110/139
ORCHID	
Prodesigner II w/ 1 mb	185
Fahrenheit 1280 degree with 1MB	289
VIDEO SEVEN	
1024 Plus w/ 512	95
V RAM II 1 mb	289
Win. VGA w/ 1 mb	159

Modems & Fax

CARDINAL	
2400 INT/EXT	82/84
2400 INT/EXT w/MNP	89/99
9600 INT/EXT	249/279
96/24 Fax modem INT	89
HAYES	
Ultra 1.44 V.32	679
Ultra 9600 ext	599
Optima 9600 V.32	349
HEWLETT-PACKARD	
Plain Paper Fax 200/310	999/1339
INTEL	
Satisfaction Modem 200/400	309/400
PRACTICAL PERIPHERALS	
9600 V.42 Int/Ext	269/279
1.44FX fax/modem Int/Ext	350/389
US ROBOTICS	
16.8 HST ext. w/ ASL	569
Dual 16.8 HST ext	749
Shared Access Kit	649
300M	
FC 9624	99

Printers

CANON	
LPB4+/LBP6+	919/1499
BJ20	399
BJ 300/330	469/599
DICONIX	
1608/701	299/439
EPSON	
LX810/AP 3250	155/219
FX850/FX1050	289/379
LQ570/LQ870	269/435
LQ1070/LQ1170	375/579
LQ2550	849
EPL8000/7500	1295/call
DFX5000/8000	1269/2139
HEWLETT-PACKARD	
Laser Series III/IIID	1549/2599
Laser IIP/IIIP	869/1049
Desk Jet 500/500c	999/759
IBM Laser	
8/8P	1479/1825
10/10P	1749/2699
NEC	
Silentwriter 95	1469
OKIDATA	
184/380	229/219
320+/390+	314/439
321+/391+	435/595
393+/393C+	819/999
400/800 LASER	599/925
810/820 LASER	1064/1249
830/840 LASER	1269/1589
4410/4450L	1299
PANASONIC	
1123/1124L	199/275
1624/1654	339/539
2180/2123	175/255
1695/2624	369/379
4410/4450L	949/1079
4430/4455	909/1719
OMB	
PS 410/815	1529/2949
Color Script 100 model 10p	4699
LASER ACCESSORIES	
Upgrade for HP III 1 mb	79
Upgrade-HP III 2mb/4mb	109/179
Pacific Data 25-N-1	249
Pacific Page PE/PEXL	259/649
Pacific Connect 258K	249
Complete Font Library	249
Font Bank Cartridge 1.5 Mb	269

Memory Boards

AST	
5x Pack w/384K XT	129
5x Pack 256 w/OK AT	95
Pamper PC w/ 1 mb	285
ORCHID	
Parquest 16/32 w/OK PS/2	199
Parquest 8/16 w/OK XT/AT	129
ACCELERATOR BOARDS	
Orchid Tiny Turbo 286/Extra	119/179

Bulldog Systems

Bulldog's Standard Configuration	
Dual Floppy Drives • Super VGA Card	
with 1 Mb RAM • 14" Color VGA	
Monitor (1024 x 768) • DOS 5.0 •	
Windows 3.1 • Mouse • 1 year	
warranty!	
386-SX/25 w/ 2 MB w/ 80 MB HD	1249
386-33 (84K CACHE) 4MB, 130HD	1549
486-33 (256K CACHE) 4MB, 213MB HD	3295
486-50 (256K CACHE) 4MB, 213MB HD	3260

Call for other configurations

Drives

CONNER	
120 IDE 3.5/200IDE 3.5	349/549
IONEGA	
90 MB Inker/Transportable 576/689	
Dual 90 ext	1495
MAGNAVOX	
461RS EXT CDW/ software	389
MAXTOR	
7120A 130 mg	389
213 A 210 mg	589
MICRO SOLUTIONS	
Backpack Ext. Floppy 1.2/1.44	189
NEC	
CDR 84 int/74 ext	509/549
CDR 37 portable	389
QUANTUM PASSPORT XL removable	
50MB/105MB	359/495
120MB/240MB	699/889
SEAGATE	
ST3096A 89 mb IDE	289
ST 3144A 120 IDE	379
SYSGEN-Mobile Disk	
40/80/120	299/589/849
FLOPPY DRIVES	
360K/1.2MB/1.44MB	59/59/59

Tape Drives

IRWIN	
Accutrak 120/250	189/239
COLORADO MEMORY SYSTEMS	
DJ10 120 Meg Int Jumbo	199
DJ20 250 Meg Int Jumbo	259
QFA 700 Meg Int	719
MICRO SOLUTIONS	
40/120 Backpack	385
80/250 Backpack	429

Mice & Misc.

Microsoft Mouse w/Windows 3.1	149
Microsoft Ball Point Mouse	119
Logitech Fotoman	519
Logitech Trackman Serial/Bus	69/85
Epson 300C w/ Interface	1175
Logitech Scan Man 256	269
Sound Blaster Pro	189

610 Industrial Park Drive
Evans, Georgia 30809
PO Box 211043, Martinez, GA 30967
OPEN weekdays: 8:30 a.m. to 6:00 p.m.
(706) 860-7364 • FAX (706) 860-7358



BULLDOG
COMPUTER PRODUCTS

No charge for credit cards. Shipping and handling extra. Payment by A/R and P/O addresses additional 5% (this may not be applied). Product warranties, others, and claims are handled by the manufacturer. (DOS) applied or updated at our option during the last 30 days only. No returns on used items. All items (shippers) are subject to a 15% minimum shipping fee. Desktop software requires own setup disk only. Call 404-860-7358 for a return authorization number prior to returning any product. Shipping charges are non-refundable. Bulldog's service guarantee is non-transferable. All prices are U.S. and are subject to change and availability. Georgia residents add sales tax.

CIRCLE 015 ON READER SERVICE CARD



MEMORY AND MORE...

Personal Computer Memory

IBM

PS/1 286, 386SX		
286	0299005	\$90
PS/2 50/204, Expansion board 148759		
286 01	5093540	\$90
PS/2 333X, 45, 405X, 58X, 553X, 15, 453X, 15, 79		
000 0450003	\$31 286 0450004	\$80
PS/2 70-82, 84X, 85X, 87X		
286	0450008	\$90
PS/2 333X, 15, 405X, 58X, 15, 653X, 15, 54900X		
000	5492855 or 0790777	\$100
PS/2 333X, 15, 405X		
000	0450703	\$340
PS/2 85, 85, AND 87X (install in pairs)		
000 0450720	\$100 000 0450950	\$340
Expansion boards for 50, 58X, 553X, 44, 453X		
2-000 with 28	148759	\$200
2-1000 with 28	0450080	\$310
Expansion boards for all models 70 and 80		
2-1000 with 28	5492077	\$320

Compaq

Portable 1/25, 25		
286 141750-001	\$30 000 141742-001	\$285
Desktop 386-25, 20K and 25		
000 Module	11032-001	\$170
000 Board	110445-001	\$240
Desktop 386/16		
000 Board	112554-001	\$170
000 Board	110434-001	\$250
Desktop 386, 386X, 386SX/25, 386/25M, 486/33M, 486/125M, 486/125M, SystemPro LT, 486SX/25, 586/25, Portable 486		
000 110400-001	\$30 286 110400-001	\$80
000 110400-001	\$100 000 112077-001	\$380
Desktop 386-33, 486-33, and SystemPro		
286 115144-001	\$170 000 110501-001	\$320
Desktop 386X, 486X, SystemPro LT 132-MK (ex. board)		
2-4000 w/28	529100-001	\$170

Zenith

Zenith Z-585/20, 25, 33 and 38		
100 ZAS5000H	\$50 000 ZAS5000H	\$170
Zenith Z-506X, 286P/L, Z-15		
286 01	Z-405-1	\$80
Zenith 486/33XT, 33T		
000 ZAC20002	\$200 1000 ZAC2000H	\$900

Hewlett-Packard

HP's 10/16, 20PC, 15/20PC, 25PC, 20K		
486 01	01542 or 1042A	\$170
HP's 386/16M, 386/20M		
286 024004	\$100 000 024004	\$120
HP's 486 PC (install in pairs)		
000 02452A	\$350 000 02451A	\$170
HP's 586/25, 486/25T, 33T (install in pairs)		
286	02301A	\$80

NEC

PowerMate 286/12, 33/16 and 50/20		
286 01	0P-410-0105	\$90
PowerMate 386/20, 25		
286 APC-1035	\$350 000 APC-1036	\$390
PowerMate 586/33E and 486/25T		
286	0P-410-5101	\$210

AST

Bravo 386-SX, 85/286, 586		
286 500510-002	\$80 000 500510-000	\$170
Premium 386/25, 33, 33T, Premium II 386SX/16, 20		
000 w/1070	500700-001; 002	\$80
Bravo 4/33, 686/25, Premium II, TE Server 38 4/33		
286 w/1070	500710-004; 700-000	\$120
000 w/1070	500710-004; 700-000	\$120
AST Premium 386/33T, 486/33T, Server 38 4/33, Bravo 486		
000 w/1070	500700-001	\$120

Please call for any upgrade not listed.

Kingston TECHNOLOGY CORPORATION

Turn your 286 into a 386 with the SX/Now!

True multitasking, background operation for Windows 3.1, OS/2, and 386 software. SX/Now! includes a Math coprocessor socket, 8KB cache and improves system performance by up to 350%.

The SX/Now! is now available for:

- HP 05286/12 & E5/E
- Epson Equity III & Epson Equity IIPlus
- IBM Original AT and XT/286
- AGI 1000A, B, C
- AST Premium 286 and Bravo 286
- Compaq Portable III and DeskPro 286
- NEC PowerMate 286+ and Portable+

IBM PS/2 25/286, 30286, 50, 502, 60
"Kingston Technology Corp.'s SX/Now! is the undisputed performance champ."

PC Magazine, Oct 25, 1991

20MHz SX/Now! \$309

25MHz SX/Now! \$359

Megahertz CORPORATION Laptop and Notebook Modems

Internal, External, Send & Receive FAX

For use in these models:

- Compaq Contura, LTE 386X/20, Lite, Portable 486
- Toshiba T1000SL/TE/LE, T1200, TE, T1600, T2000SL, S16, T3100, T3100A, T3100SL, T3200SL, T3100 and T3200
- Zenith Z-Note, Super, Master, Mini, SlimPort
- AST Premium Executive Notebook
- Sharp G220, 6641
- TI TravelMate 2000, 3000

All Megahertz modems include:

- Easy installation with illustrated user's guide
- Full 5-year warranty
- Hayes-compatible
- 2400bps w/V.42bis MNP-5 \$170
- 24/9600bps w/V.42bis MNP-5 Send/Rec Fax \$310
- 96/9600bps w/V.42bis MNP-5 Send/Rec Fax \$420
- Universal Pocket Modems for any RS232C serial port
- 24/9600bps w/V.42bis MNP-5 Send/Rec Fax \$270

BOCA RESEARCH INC.

Expansion Boards

Bozart AT 1020-20M for XT and PS/2 25 and 50 machines, Provides 12M 4.0 expanded memory only.		
w/102K	\$120 w/1/1000	\$160
w/100K	\$162 w/2000	\$220
Bozart AT Plus 2-4000 memory board for 06280 & 06580 486 compatible machines running up to 33MHz. Get custom fitted, upgraded (16M 805 & 4.0) and/or extended memory, supports 06/2.		
w/2000	\$180 w/4000	\$280
w/6000	\$240 w/8000	\$370
Bozart AT 1/0 Plus 2-4000 memory board, same as AT Plus with 1 serial and 1 parallel port. Uses 100 x 1 1/2 8000 chips.		
w/2000	\$190 w/4000	\$270

Video Cards

Basic VGA 640x480 16 color	\$80
Super VGA 928 1600x1200 16 color	\$110
Super X VGA 1024 1600x1200 256 color	\$160

Diamond Computer

SpeedStar V-100 High-Color VGA 100	\$205
SpeedStar 24 True Color Card	\$180

COMPATIBILITY 100% GUARANTEED

100% COMPATIBILITY
100% GUARANTEED

AND SUPPORT.

- ◆ 30 Day Money Back Guarantee
- ◆ Installation instructions included with all products
- ◆ Toll-free technical support
- ◆ All products are user installable
- ◆ Manufacturer's warranties
- ◆ Thousands of products in stock
- ◆ APO/FPO, and international orders welcome
- ◆ Purchase orders accepted from Universities, Qualified Firms, and Government Agencies.
- ◆ Special pricing on volume orders

DELIVERY GUARANTEED



- ◆ Fast, Inexpensive, dependable delivery to any worldwide destination with Federal Express.
- ◆ Same day shipping
- ◆ Overnight delivery available
- ◆ You are never charged a surcharge on your credit card



TOLL FREE FROM THE US OR CANADA
800/535-5892

INTERNATIONAL

714/588-9866

FAX LINE

714/588-9872

BUSINESS HOURS

Monday-Friday, 8AM-5PM

Saturday, 10AM-3PM, P.S.T.

First Source International

The Only Source

First Source International

First Source International

First Source International

First Source International

First Source International

First Source International

First Source International

First Source International

First Source International

First Source International

First Source International

First Source International

First Source International

First Source International

First Source International

Laser Printer Memory

Hewlett-Packard LaserJet HP, 10, 10P, 100		
286 104750	\$110 000 104750	\$170
Hewlett-Packard LaserJet II and 100		
286 104048	\$110 000 104048	\$170
Hewlett-Packard LaserJet 100		
000 C2000A	\$100 000 C2000A	\$150
Hewlett-Packard LaserJet 500, 500X		
250K	527070	\$40
IBM Laser 405X 405X		
286 1100004	\$170 000 1100005	\$180
Canon LBP-4		
000 300-2250	\$160 286 300-2250	\$250
Canon LBP-10 and 100 Plus		
286 300-2500	\$160 300 300-2500	\$290

Brother HL-4, HL, 40, 40, 40		
100 100-010	\$140 286 100-010	\$160
Panasonic 4010 and 4030		
286 01-P041	\$120 000 01-P041	\$200
Panasonic 4030 and 4030		
286 01-P041	\$120 000 01-P041	\$200
01-Laser 400		
000 7004701	\$90 286 01-P041	\$120
Texas Instruments MicroLaser II		
000 200570-0001		\$10
EPSON LPT 3000		
286 105401	\$110 000 01-P041	\$180
EPSON LPT 3000		
286 105401	\$110 000 01-P041	\$180

TOLL FREE 800-535-5892

“Advertising in PREMIER is one of the smartest decisions we’ve made!”



“We’ve advertised in **PREMIER** since the very first issue, and it’s one of the smartest decisions we’ve made.”

Our ad produces consistent results from Fortune 1000 companies. PC Magazine **PREMIER** puts us in front of the people who play key roles in purchase decision-making. Anyone who believes that time is money should take the time to check out **PREMIER!**”

Don Campbell
Campbell Services



PREMIER offers the power of full-color advertising in two crisp, attractive ad sizes. When you're ready to advertise to the largest group of PC buyers in the industry, you're ready for PC Magazine **PREMIER**.

It's here...

PREMIER

1-800-825-4237



PC MARKETPLACE

I N D E X

Windows

An every-issue four color section featuring quality products for the Windows environment.

472

Premier

The color showcase that puts the spotlight on leading-edge PC products and services.

473-479

Classified

Flexible-format display advertising: computer systems, components, software and more.

480-486

BusinessCard

A forum for innovative, hard-to-find and low cost PC hardware, software and services.

489-493

	Premier	Classified	Business Card		Premier	Classified	Business Card		Premier	Classified	Business Card
HARDWARE				CD-ROM	476			Real Estate			491
Add-In-Boards	473	480	489	Communications/Networking	476	481	490	Religion		483	492
CD-ROM	473	480	489	Computer Languages			490	Sales Marketing		483	492
Communications/Networking	473		489	Construction			490	Scientific			492
Computer Systems	473	480	489	Data Base	477	481	490	Security		483	
Connectivity				Data Entry		481		Software Search Services			492
Disk Drives	474			Desktop Publishing				Statistics			492
Diskettes		480		Diagnostic				Surveys			492
Expansion Units/Upgrades	474	481		Education	477	482		Taxes			
Input Devices				Engineering		482		Utilities	479	484	492
Laptop/Portables				Entertainment/Games		482	490	Windows			492
Monitors				Financial	477			Word Processing			
Peripherals	474		489	Flow Chart	478			MISCELLANEOUS			
Peripheral Sharing Devices				Fonts				Accessories			
Power Supplies				Foreign Languages			490	Bar Coding	479	484	
Printers		481		General			490	Books/Catalogues			
Rentals				Graphics	478	482	490	Business Opportunities			492
Security				Health			491	Data Conversion		485	
Storage Devices	474			Inventory			491	Data Recovery Services		486	
Tape Drive Subsystems	475			Mailing Programs		483	491	Desktop Publishing Services			
SOFTWARE				Maintenance/Preventive Maintenance			491	Disk Conversion		486	
Accounting		481		Manufacturing				Diskette Copy Services		486	493
Backup Systems				Mapping				Insurance		486	493
Business			489	Medical			491	On-Line Services			493
Business Time Management	476			Music		483		Services			493
CAD/CAM	476		490	Programmers Tools			491	Supplies	479	486	
				Project Management				Training/Tutorials			
				Public Domain/Shareware		483	491				

PC MAGAZINE MARKETPLACE • 1 Park Avenue, 3rd Floor, New York, NY 10016

For information on advertising in Windows, Premier, Classified, or BusinessCard, contact your account representative or call 1-212-503-5115 or 1-800-825-4237

ADD-IN-BOARDS-MAILING PROGRAMS

Get WinVision!



Connected your camcorder, VCR or other video source to the WinVision™ board to create your own computer images, importing them into your favorite applications. e touch, edit, get printouts, even send faxes (With your PC fax board)

- real time frame grabber, no still mode required
- Fast 1/30s capture time - TRUE 64 gray scales
- live or recorded material - BBW or color sources
- HiQ notch filter for sharp images

Bundled with award winning PhotoFinish™ 1.0 software (requires Windows 3.0 or higher)

- direct, fast image capture
- Powerful edit, selection, retouch and paint tools
- brightness and contrast controls
- special effects and filters, like mosaic, emboss, noise, motion blur, soften, sharpen
- reads/writes images as PCX™, TIF, BMP, GIF, MSP, TGA and EPS (Write only)
- prints up to life size, multi-page posters on most dot matrix, inkjet and laser printers

For non-Windows users, bundled optionally with PC Paintbrush IV Plus™ (640 K min, CGA, Hercules or better, printing device)

CAPTURE ANY VIDEO IMAGE INTO YOUR PC FOR ONLY \$139
SOFTWARE INCLUDED

QUANTA

2629 Terminal Blvd - Mountain View - CA 94043

(Orders only 1-800-682-1738) 415-967-5791

Fax: 415-967-8762

©Copyright and TM notice: WinVision is a trademark of QUANTA Corp. PCX, PhotoFinish and PC Paintbrush IV Plus are trademarks of Zsoft Corp. All other trademarks belong to their respective owners.

CIRCLE 1001 ON READER SERVICE CARD

ROM BIOS UPGRADES

- For Your IBM or Compatible-A New BIOS Upgrade Will
- Support Windows 3.0/3.1 • Support 360K, 720K, 1.2MB & 144MB Floppy Drives
 - User defined hard drive types • Support VGA • Novell & Netware compatible
 - Expanded hard drive table • Enhanced 101 102 keyboard • 100% IBM compatible
 - Complete documentations • DOS 5.0 • Latest Version • Complete set up in ROM
 - PS/2 Mod 30

FREE INTEL CHIP PULLER

ROM BIOS UPGRADES AVAILABLE FOR:

- | | | | |
|----------------|-------------|------------------|-----------------|
| • IBM | • Sperry | • Hyundai | • Wyse |
| • Acer | • Northgate | • Sanyo | • Kaypro |
| • Leading Edge | • Tandy | • Samsung | • Compaq |
| • DTK | • AST | • Wells American | • Everex |
| • Dell | • AMI | • Epson | • And Many More |

ORDER TODAY



UNICORE
BIOS UPGRADES

1-800-800-2467

1830 Turnpike St. • North Andover, MA 01845
(508) 686-6468 • FAX (508) 683-1630

CIRCLE 1003 ON READER SERVICE CARD

SoftSpoken Mailer

File Edit Search Group Print Manage Window Help

Record # 2083 of 2084 (0 deleted)

C:\SM\DATA\MAILLIST.SM

First Last

Bruce

Company

SoftSpoken Inc.

Address 1

PO Box 18343

Address 2

City

State

Zip

SoftSpoken Mailer™ Mailing List Manager for Windows

Slash Postage Costs Up To 60% or More!

- Tap USPS ZIP+4, carrier route & forwarding address database
- Print USPS-certified barcoded labels • Presort bulk mail
- Mail merge WordPerfect & Word for Windows
- Eliminate duplicates • Free brochure:

(919) 870-5694

SoftSpoken Inc.
PO Box 18343
Raleigh, NC 27619

CIRCLE 1004 ON READER SERVICE CARD

NOBODY DOES WINDOWS BETTER!

Now you can target the fastest-growing segment of the computer market—the Windows market—with an affordable color ad in the Premier Section of PC Magazine. Not only the biggest computer publication of all time, but the most regularly read publication by PC buyers. Now, PC Magazine Marketplace's Premier—the dazzling color showcase for leading-edge PC products and services—rolls out an exclusive set of display pages only for Windows advertisers.

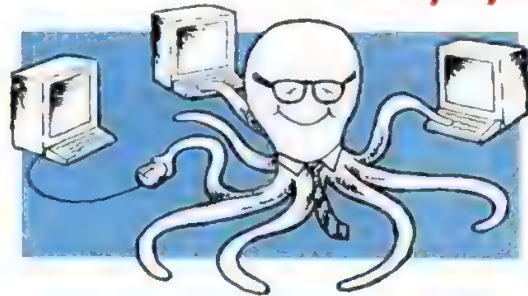
Place your Windows ad in Premier and open up new opportunities with PC Magazine's 900,000+ PC brand specifiers—by far the lion's share of buyers for the record-breaking 5 million copies of Windows sold in just 18 months.

PC Magazine Premier Windows: the power of four-color advertising in three crisp, attractive ad sizes, just like the rest of Premier. Designed to beautifully showcase your Windows product or service. PC Magazine readers don't go "window-shopping". They come to buy. Be there when they do.

PC MAGAZINE PREMIER WINDOWS.

Call today to reserve your space! 800-825-4237

PC-EXPANDER PLUS™ by cybex



Connect up to 8 VGA Monitors, Mice and Keyboards to a Single PC

- PC/AT, PS/2 and 100% Compatibles
- VGA up to 1024 x 768 Resolution
- Selectable Takeover Delay
- Use either PS/2 or Serial Mice



Made in USA
Dealer Program Available

Cybex Corporation

2800-H Bob Wallace Ave. • Huntsville, AL 35805 U S A
(205) 534-0011 • FAX (205) 534-0010

CIRCLE 1009 ON READER SERVICE CARD



BLAST YOUR MESSAGE THRU!

Voice Mail • Telemarketing • Call Processing

Transform your PC/XT/AT/386 into a multi-line processing command center. intelligently process your sales, inquiries, and messages. Complete package

(Developer/OEM packages available)
VISA — MC — AMEX — CDO

Multi-Line \$995
SINGLE LINE (8ignOut) \$295

For Sales or Information:
Call 1-800-934-4884
CALL (510) 522-3800 • FAX (510) 522-5556

TALKING TECHNOLOGY, INC.
1125 ATLANTIC AVE • ALAMEDA, CA 94501

CIRCLE 1006 ON READER SERVICE CARD

CDROMS 24.95

Simtel20 MSDOS CD \$24.95
680 meg, 8300 programs, Programming tools, dos utilities, tech docs, comm, mail, publishing, jam-radio, education, much more. 1885 support. June 92

CYCA MS Windows CD \$24.95
Hundreds of MS Windows programs, Utilities, games, source code, programming tools, 1885 support. July 92

Source Code CD \$39.95
600 meg source code for games, utilities, etc. Mostly Unmet Unix/C. Lots of Pascal, C++, Fortran, Lisp, Modula, etc. March 1992

Desktop Library CD \$39.95
Thousands of Words, Retorical Documents, classic literature, reference works & Internet RFC's.

OS/2 CD \$24.95
180 meg of OS/2 software and nearly 2000 OS/2 programs.

Gifts Colors CD \$24.95
Over 6000 full-color images

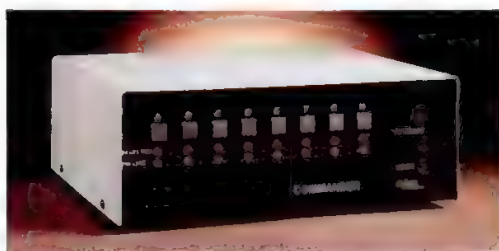
CDROM Caddies \$4.95

1 800 786-9007 +1 510 947-5996 +1 510 947-1644 FAX

Walnut Creek CDROM
1547 Palos Verdes Mall, Suite 260 Walnut Creek, CA 94596

CIRCLE 1007 ON READER SERVICE CARD

CONTROL UP TO 96 PC FILE SERVERS WITH 1 KEYBOARD AND MONITOR USING... **COMMANDER** by cybex



- Select via Keyboard
- Shows PC power status
- Dual access up to 250 feet away [optional]
- PS/2 Mouse support available
- No external power
- Each unit accommodates from 2 to 8 PCs
- Mix PC, PC/XT, PC/AT and PS/2
- Up to 12 units can be cascaded
- "AutoBoot™" Feature boots attached computers without operator intervention
- Mounting kit available for 19" and 24" rack installation

Dealer Program Available

Cybex Corporation

2800-H Bob Wallace Ave. • Huntsville, AL 35805
(205) 534-0011 • FAX (205) 534-0010

CIRCLE 1008 ON READER SERVICE CARD



486-33 Notebook up to 340 MB Hard Disk

- ▶ up to 16 MB RAM
- ▶ 32 grey scale VGA
- ▶ PORTS-2 serial, 1 parallel
- ▶ 1 external keyboard, 1 VGA

FREE TRACKBALL!

ACCESSORIES
Docking Station—two 16 bit card slots
SVGA Card, Network Adapter
Fax/Modem, car adapter
Color Model Available!

Unlimited Power! (800) 370-3322
449 Main Street Bennington VT 05201

CIRCLE 1010 ON READER SERVICE CARD

ANNOUNCING

Computer Select™

The Most Complete Database of Computer Product Information Available

With COMPUTER SELECT you'll never again risk making the costly mistake of acquiring the wrong product. Now, using your own PC, you can identify, evaluate and select the best products that meet your requirements and your budget. Easy-to-use search software lets you quickly retrieve the documents you need from the vast database of product reviews, specifications, announcements and buyer's guides.

Get instant access to more than...

- 70,000 articles and abstracts each month
- Complete specs for 70,000 hardware, software and communications products
- Profiles of 12,000 companies, including addresses and phone numbers
- 9,000 definitions of computer and telecommunications terms.

Discover the power of this new CD-ROM product. Call now for your free, no-obligation demo disk. Then, if you wish, you can subscribe for \$995.*

COMPUTER LIBRARY™
One Park Avenue,
New York, NY, 10016

CALL NOW FOR A FREE DEMONSTRATION DISK
212-503-4400

Computer Library and Computer Select are trademarks and Data Sources is a registered trademark of Ziff Communications Company. ©1991 Ziff Communications Co.
*U.S. and Canada only. Outside U.S. \$1195

BACKPACK IS TRANSPORTABLE.



Adding an easy-to-carry hard drive to your portable computer has never been easier! Backpack from Micro Solutions connects quickly to the parallel printer port of any PC compatible or portable - without interface cards or tools. Several computers can share

one Backpack, so you can back up your work or take it home to another computer. Diskette and tape drive models are also available. Backpack. Don't leave home without one. Call today for more information.

backpack

MicroSolutions
Computer Products

112 W. Lincoln Hwy., DeKalb, IL 60115 B15-756-3411 Fax B15-756-2920

CIRCLE 1011 ON READER SERVICE CARD

NEW SPACE-SAVER STAND-ALONE LCD MONITOR



\$995 This 10" black on white monitor is easy-to-read, yet compact. Resolution is 640x480 for sharp, flicker-free image. Sharp's high refresh rate, triple supertwist nematic technology with back lighting provides a super bright, low radiation screen with a wide viewing angle. The adjustable monitor base is only 29x14 cm. It lets you mount the LCD monitor on vertical surfaces or fold for transport. Comes with 1.5 m cable and VGA adaptor card. No external power required. IBM AT compatible.

DATALUX

First Choice In Space-Saver Peripherals

2836 Cessna Dr. • Winchester, VA 22601

Call Toll-Free To Order

1-800-DATALUX



CIRCLE 1013 ON READER SERVICE CARD

UPGRADES, ETC. YOUR UPGRADE SOURCE ACCESS ALL THE NEW TECHNOLOGY

Need IDE, 1.44MB, 2.88MB, four floppy or VGA Support? Novel, Windows or OS/2 Problems? Solve Your Hardware and Software Problems Today with one of Our Quality BIOS Solutions.

ROM BIOS UPGRADES

MB BIOS KEYBOARD BIOS Call
MB BIOS OPTI386/486 Call
AMI XT Call/AMI BMXT Call
AMI 286 for DTK Call
AMI 286 for IBM For
AMI 386 C&T
PHOENIX COMPAQ286 Price!

MANY MORE IN STOCK!

MEMORY UPGRADES

4x9600SSIMMS \$149
Par KX4410 44302MB \$104.95
Par KX4420 44501 \$139

HEWLETT PACKARD

HP111, HP112 OKBOARD \$39
HP111, HP112 2MG \$98 4MG \$177
HP111, HP112 1MG \$85 2MG \$115
HP111, HP112 4MG \$179

IBM Laser Printers

4019/4019 OKBOARD \$67

4419/4419 1MG \$89 2MG \$129

OTHER MANUFACTURERS AVAILABLE

TTI SYSTEMS

386, 486 VGA 1.44MB system \$1499

And More!

Free Technical Support

1 Year Warranty

WE WILL NOT BE UNDERSOLD

Free Catalog

UPGRADES, ETC. 800-955-3527

THUNA TECHNOLOGIES

24 Hr. FAX Order Line 805-650-6515

International UK France Germany MC VISA
2432-Palma Dr. Ventura, Ca 93003 AMEX COD
805/650-2030 Corp & University
Se Habla Espanol P.O.s Welcome

MOTHERBOARDS from \$85

TTI-28620MHz 286
TTI-386SX25MHz \$175
TTI-38640MHz w/64KCache \$325
TTI-48650MHz w/256KCache \$999
AMI Boards & SAMBS available Call

Alpha Research Local Bus

MAKES NE 486 Local Bus Motherboard and Supports 486SX up to 486-50MHz K1 w/18.32 bit video and 32Bit Data Bus Cache Controller w/o CPU \$999
Call for prices with CPU

MULTIMEDIA

1.5mba 3301 w/interface and Tools Kit Kit Bundle \$799
Smart and Friendly 280MS w/toolkit Bundle \$95 And More!

CAT SuperMath Coprocessors

Improves Performance up to 60% An instruction level Faster than Intel CoProcessor Easy installation in any 486SX LX Systems Lifetime Warranty
387SX16 \$85 387DX33 Call
387SX20 \$90 387DX40 Call
387SX25 \$95 And More!

World's First Dual Capacity - 256MB/128MB Rewritable 3.5" Magneto-Optical Drive Introductory Offer - only \$1,748



VISTA V256

- **Full compatibility** - Vista V256 reads & writes to ISO Standard 128 MB format cartridges, and a true, non-compressed 256 MB to GZ format cartridges
- **Reliable** - features the acclaimed M.O.S.T. mechanism as used in the award-winning Vista V128 3.5" MO drive
- **Fast** - transfer rate up to 1.2 MB per second
- **Economical** - additional 256 MB cartridges only \$89
- **Versatile** - Mac and IBM compatibility

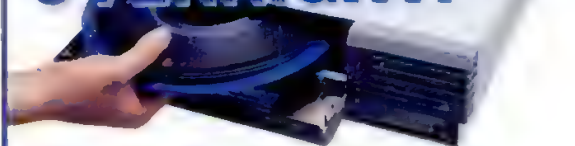
Order Direct **800.944.6232**

OCEAN

OCEAN Microsystems, Inc.
246 Hacienda Avenue
Campbell CA 95008 USA

CIRCLE 1014 ON READER SERVICE CARD

YOU DON'T BECOME THE BEST IN 9-TRACK OVERNIGHT.



These pages are littered with ads from small 9-track outfits. None have the kind of experience we have. Overland Data has been *designing and manufacturing* 9-track products since 1980, and we're in this market to stay. Today we build the most modern, reliable tape drives on the market, including the world's smallest autoloading drives. And our customer support program consistently gets high marks from our customers. It takes a lot of expertise to achieve all this, and that only comes with time. So don't entrust your application to a questionable company. Go with the proven leader: Overland Data.

800-729-8725

OVERLAND DATA

TEL 619 571 5555 • FAX 619 571 0982 • EUROPE TEL 49 6172 35027 • FAX 49 6172 35028

CIRCLE 1015 ON READER SERVICE CARD

BEST 9-TRACK TAPE SOLUTION OF THE 90'S!



- PC 286/386/486
- RISC/6000 • AS/400
- SUN • HP • DEC • APPLE

*Our name begins with Quality!
Call us today for
price and information.*

QUALSTAR®

9621 IRONDALE AVE., CHATSWORTH, CA 91311
FAX (818) 882-4081 • (818) 882-5822

CIRCLE 1015 ON READER SERVICE CARD

Connect with the Parallel Universe SIGEN 250MB PORTABLE PARALLEL PORT TAPE BACKUP

No controller card required. Connects to parallel port. Installs in less than 3 minutes. Great for Laptops. To 9.5 MB/min transfer rate

Capacity
20 MB Parallel Port Floppy
80 250 MB 1/4" cartridge 4.5 MB/Min
60/200 MB 1/4" cartridge 9.5 MB/Min
250/500 MB 1/4" cartridge 9.5 MB/Min
1.3 GB 1/4" cartridge SCSI 18 MB/Min
1.2/2 GB 4mm DAT SCSI 10MB/Min

Supports
DOS, OS/2
Novell 286, 386
UNIX, XENIX

Industry standard SYTOS PLUS, or CENTRAL POINT BACKUP software and for file server based NLM and VAP TAPEWARE.



Phone (408) 737-3904 • Fax (408) 737-3910

CIRCLE 1019 ON READER SERVICE CARD

New! PCTD-16 Controller Kit

The new PCTD-16 Controller Kit has even more power than our PCTD-1, the PC Magazine "Editors' Choice" among nine-track back-up devices. Read/write to 9-track tape with your IBM® PC XT®, PC/AT®, 386®, 486®, PS/2® and compatibles. Exchange data with other PCs, minis and mainframes using a variety of tape densities.

800/1600/3200/6250 BPI
Systems are available.



PCTD-16 Features:

- 16 bit direct I/O, 256K or 1MB onboard cache
- Data transfer rate up to 43.56 MB/Minute
- Interchange and backup software
- ReelView data extraction & conversion software
- Toll-free sales and technical hot line support



Computer Logics Limited

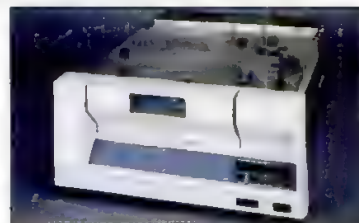
31200 Carter St., Cleveland, OH 44139
800-828-0311 or 602-861-0202 • Fax: 602-861-0383

Portion reprints printed with permission from PC Magazine, April 25 1989
Copyright © 1989 Ziff Communications Company *Registered U.S. Patent Office

CIRCLE 1016 ON READER SERVICE CARD

9 TRACK TAPE DRIVES 3480 TAPE DRIVES FOR PC/XT/AT/386/486/PS2

**LOWEST
PRICES
BEST
QUALITY**



LAGUNA DATA SYSTEMS

23151 Alcalde Drive
Suite B-3
Laguna Hills, CA 92653



(800) 886-4827
714-586-3010 TEL.
714-586-5538 FAX

CIRCLE 1020 ON READER SERVICE CARD

3480 - 9TRACK

FOR PCS AND WORKSTATIONS

DOS • SUN • MAC • UNIX • XENIX • RS/6000

* TAPE DRIVE SALES & RENTALS

MANUAL/AUTOLOAD DRIVES

50/125 IPS

SCSI/PERTEC

800/1600/3200/6250



GSA SCHEDULE

* CONVERSION SERVICES

* TAPE DUPLICATOR SYSTEMS

1-800-362-6250

**INTERFACE
SYSTEMS
INC.,™**

FAX: 301-309-8355
Rockville, Md.

"Real People with Working Solutions"

CIRCLE 1017 ON READER SERVICE CARD

9 TRACK MAGNETIC TAPE SYSTEM FOR IBM PC/XT 286/386/486

- Mainframe to PC Data Transfer
- Data Transfer & Backup to 24 MB/min
- DOS, UNIX Software, Complete System
- Service and Support, Easy Installation
- SCSI Bus Interface Compatible
- 3480 Tape Cartridge Systems

call (919) 763-8400 or write to:

CONTECH Computer Corp.

4304 Market St. Wilmington, NC 28403



CONTECH

CIRCLE 1021 ON READER SERVICE CARD



Simulated 256 color, 640 x 480, VGA GIF photo of calendar model Cindy Margolis!

Breakthrough news... Now, because of an exclusive arrangement with **INSIDE SPORTS**, you can bring their famous Swimsuit Issue to life on your PC! This amazing new graphics calendar program features breathtaking, real-to-life, "full-view" 256 color VGA photos of the beautiful models of **INSIDE SPORTS**. If you have a color monitor, then you have to get this revolutionary new program, it makes working and planning your day on your PC fun!

Your **INSIDE SPORTS** VGA Photo Calendar is fully-functional, menu driven and is easy-to-use. It comes with daily perpetual calendar and appointment book, sound alarm, card file, calculators, autodialer and much more. Your special 16-month photographic quality calendar starts the day you install it (photo refills available) and works on all VGA and Super VGA color monitors; DOS & Windows utilities included. Only \$39, plus \$4 for S&H. Please add \$7 for 2nd Day Air delivery and \$3 for 3.5" disks. Satisfaction guaranteed or your money back!

ORDER NOW
24 hours/7 days



For same day shipment send check or money order to:

DeskTop Software
96 Phoenix Ave., Dept. M10
Enfield, CT 06082

1-800-525-4437

Distributors, Bundles, and National Accounts welcomed 203-741-8535

CIRCLE 1022 ON READER SERVICE CARD

CD-ROM

HammerHead has teamed up with professional photographers and the best shareware authors to bring you the easiest and most cost effective way to look for stock photos.

Includes 5 programs for Windows 3.1
Artshop
Paint Shop
Photo
Wallman
WinGif

Super VGA 1024x768x256 color images

- #908 Mother Earth II **NEW** \$59.88
Contains 400 beautiful images, read, to be used in Windows applications. Categorized into 10 groups: Country, Nature, Sunset & Waves, Photos by Professionals, New York, People, Blue, Clouds.
- #909 Lovely Ladies II **NEW** \$59.88
From the "HammerHead" Artshop, 100 beautiful images, categorized into 10 groups: Fashion, Nature, Sunset & Waves, Photos by Professionals, New York, People, Blue, Clouds.
- #911 Night Owl's Shareware Disc version 6.1 **NEW** \$99.88
A collection of shareware programs, including: Artshop, Paint Shop, Photo, Wallman, WinGif, and more.
- #900 CD-ROM discaddy \$10
Buy 2 CD-ROMs and get \$10 off each disc. Buy 4 or more CD-ROMs and get \$20 off each disc. Buy 3 CD-ROMs and get \$15 off each disc. you save \$80 or more.

Send check/money order to: **Starware Publishing Corp.**
P.O. Box 4188, Dept. 69
Deerfield Beach, FL 33442
Voice 305-426-4552
FAX 305-426-9801

More info, foreign orders & dealers call: **US & Canadian ORDERS ONLY 800-354-5353**
24 hours / 7 days

Domestic shipping - UPS \$4.50 Ground \$7.2nd Day \$15 Next Day FL add 6%
Foreign shipping - USPS Express Mail (allow 7 days) \$18 Canada \$22 other foreign

CIRCLE 1023 ON READER SERVICE CARD

Raster-to-Vector Conversion Software

Scan into CAD and most other drawing programs!

Before ENVISION IT
Conversion:
TIF (raster file)

After ENVISION IT
Conversion:
DXF (vector file)

1-800-365-SCAN (7226)
30-Day, 100% Money Back Guarantee!

\$299 ENVISION IT Software Version 2.0
\$399 ENVISION IT with ENV64—Envisions' 400 dpi hand-held scanner. Total retail value \$498.

DOS

FREE ISSUE!

Inside DOS is guaranteed to help you get the most out of DOS. But don't take our word for it. See for yourself.

Subscribe today and you'll get 13 issues for the price of 12 for only \$39! If you decide *Inside DOS* is not for you, mark "cancel" on your invoice and return it. Your free bonus issue will be yours to keep with no further obligation.

Call for your FREE ISSUE today!
1-800-223-8720
Please mention code V5NY

MULTI USER BBS

THE MAJOR BBS

Now Shipping Version 6.0!

It's the perfect way to coordinate communications between hundreds of people, around your office, or around the world. For more information, call...

Sales & Literature Hotline
1-800-328-1128

GALACTICOMM

CIRCLE 1024 ON READER SERVICE CARD

FAX

Directly From Any

DOS OR WINDOWS

APPLICATION




IT'S THAT EASY!

DELIRINA's new DosFax PRO, and WinFax PRO the best selling fax software in the world. Now sending and receiving faxes on your PC is as easy as clicking your mouse or hitting a hot key!

**Call your local dealer today!
or for ordering information call:
1-800-268-6082**

60 DAY MONEY BACK GUARANTEE

DELIRINA

WinFax, DosFax and Delirina are trademarks of Delirina Technology Inc.

CIRCLE 1025 ON READER SERVICE CARD

EARN YOUR COLLEGE DEGREE AT HOME

B.S. & M.S.

In Computer Science

Get the opportunity and earning power a college degree confers—without leaving home and without spending thousands of dollars

- Approved for tuition reimbursement by leading corporations
- ALL COURSES BY CORRESPONDENCE
- Most courses interactive
- Approved Ada course available
- Qualified instructors available on telephone help lines

Phone: 1-205-323-6191 • FAX: 1-205-328-2229
2101 PCX Magnolia Ave. • Suite 200 • B'ham, AL 35205

CIRCLE 1027 ON READER SERVICE CARD

The Total Financial Computing Package

MULTICALC



- Loan Amortization Simple to complex
- APR Regulation "Z" ARM GEM
- Leasing Schedules Lease vs Buy
- Payment Recording System
- Bonds IRA Calculations
- Depreciation SL/DB/SYD/ACRS/MACRS
- Finance/Investments FV/PV/FVA/PVA IRR/NPV
- Lotus dBase Quattro File Compatible
- Memory Resident Option
- All this power yet easy to use

And 70 other features that will turn a few keystrokes into a wealth of financial information

~~\$149~~ **\$99** Introductory Price

1-800-262-6890 • VISA / MC / AMEX

PC WORKS, INC., 801 Madrid Street - Suite 105
Coral Gables, Florida 33134

CIRCLE 1028 ON READER SERVICE CARD

You've Got the Power to Develop the Future.

PLUS

filePro

Professional Application Development Tool

*The only package you'll ever need regardless
of platform or operating system.*

filePro Plus is the right combination of simplicity and sophistication, programming power and user ease, technical superiority and portability across the technologies of today and tomorrow.

- 1 Billion Records/File
- 64kb Record Length
- 999 Fields per Record

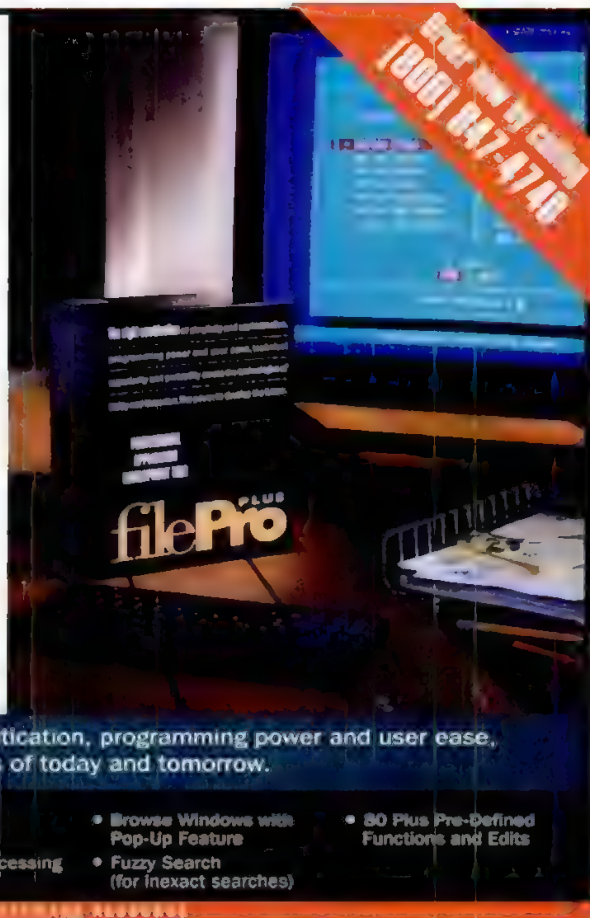
- 26 Indexes
16 system maintained
10 user maintained
- 32 Associated Fields

- Unlimited Files/Applications
- Event Driven Processing

- Browse Windows with Pop-Up Feature
- Fuzzy Search (for inexact searches)

- 80 Plus Pre-Defined Functions and Edits

CIRCLE 1026 ON READER SERVICE CARD



CALL NOW TO ORDER
(800) 847-4740

ANNOUNCING



Version 7.0

- Full Color Support
- Network Support
- Global search & replace
- 3D Charting
- Over 270 output devices supported

DON'T buy any flowcharting product until you test drive EasyFlow. Unprecedented support for Desktop Publishing & Graphics packages, Alternate Shape Libraries, FREE tech support and a NO RISK 30 Day Money Back Guarantee all combine to make EasyFlow the industry leader and corporate standard.

Vendor Direct List Price

\$280

Plus Shipping

HavenTree Software Limited
P.O. Box 470-P
Fineview, NY 13640-0470
Tel: (613) 544-6035
Fax: (613) 544-9632



ORDER HOTLINE 1-800-267-0668

CIRCLE 1029 ON READER SERVICE CARD



SuperVGA

Computer Images

Also VGA/EGA/CGA/Mono and Animation

1024x768x256

Photographic Quality Real Color Images



Actual computer scanned images

BBS

1-800-GO-MODEM
Toll-Free Lines

Exclusive from Event Horizons, 50,000 top quality, state of the art color MaxiPic GIF images and Sound VGA Movies, all categories, ratings, resolutions.

BBS 800-GO-MODEM,
or BBS 503 697-5100. \$12/hr.
Toll-Free lines \$8/hr extra

No Modem? Order our Mail Image Library with Samples for \$9. World-wide shipment. Info voice line 503-697-7700. Credit cards accepted. Same day shipment anywhere.

Event Horizons

311 Ave B, Suite 200
Lafayette, CA 94504
Information: 503-697-7700



CIRCLE 1031 ON READER SERVICE CARD



Use Flow Charting 3 for a variety of charting needs

- Flowcharts
- Organizational Charts
- Process Control Charts
- Data Flow Diagrams
- Network Diagrams
- Work Flow Diagrams

Presentation-Perfect Flowcharts — In No Time !

If you need a quick and efficient way to construct charts and diagrams, but don't want to spend hours learning a complicated computer program, then take a look at Flow Charting™ 3.

Flow Charting 3's strength lies in its flexibility. Shapes, lines, and text can be placed anywhere on the page. In fact, you can even modify shapes to suit your own purposes and save them for future use.

Flow Charting 3 gives you the power to tailor your charts and diagrams exactly to your own needs and specifications. Then you can quickly and easily include them in your WordPerfect 5.0 or 5.1 document by using our custom export filter.

But Flow Charting 3 is more than flexible, it's easy to use. In fact, with Flow Charting 3 you can be up and running within an hour. If you don't believe us, try it out for yourself.

See your dealer today or call for a free interactive demo.

800-525-0082 ext. 2413

International: **408-778-6557 ext.2413**

PATTON & PATTON
Software Corporation

Excellence in charting the flow of ideas!

WordPerfect is a trademark of WordPerfect Corp. Flow Charting™ 3 is a trademark of Patton & Patton Software Corp.
Patton & Patton Software Corporation, 485 Cochrane Circle, Morgan Hill, CA 95037

CIRCLE 1030 ON READER SERVICE CARD



Scientific Graphics
Publication Quality

Graphic Features

- Linear, log, polar, triangle plots
- Smith and bar charts
- Shaded contour & 3-D plots
- Export PIC, GEM, HPGL, TIFF files
- Source code for full control
- 23 fonts, 16 symbols, 9 linestyles
- Simultaneous plots
- Insert one plot into another plot
- Color PostScript™, EPS
- High-resolution Tektronix® format
- Supports most printers, plotters, and graphics cards

Licensed for personal use only

Windows® version now available
No windows programming required

"All of the C language routines you need to write an impressive scientific graphing program of your own. Highly Recommended"
PC Magazine 3/14/89

Scientific Endeavors
508 North Kentucky St.
Kingston, TN 37763
(800) 998-1571
(615) 376-4146 FAX: (615) 376-1571

CIRCLE 1032 ON READER SERVICE CARD

PERFORMANCE 2.0 !!

"Go as fast as 32 bits can take you"



PERFORMANCE 2.0 is both a 50 page booklet and 15+ software objects for the price of \$14.95.

Unleash the power of OS/2 on your desktop. **PERFORMANCE 2.0** is a tuning kit for OS/2 2.0!

- All Systems - 386SX through 486DX
- Memory usage - 4MB through 64MB
- Disk Space - "as little as 8MB"

The booklet explains to all users the inside track to optimizing OS/2 2.0. Software objects that let you tune your system with the click of a mouse! Clarity & Simplicity guaranteed!

Send \$17.45 (\$14.95 + \$2.50 S&H) to:
(check/money order, VISA, MC)
or call (203) 658-1204

CLEAR & SIMPLE, INC.
P.O. BOX 130
W. SIMSBURY, CT 06092

CIRCLE 1034 ON READER SERVICE CARD



Slide Imagers

Postscript Imaging from PC/Mac Files
from 35mm Presentation, Graphic, and Page Layout Files

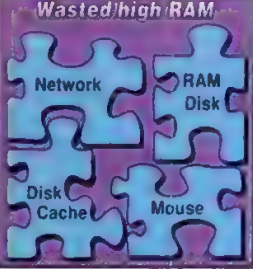
- 35mm Color Slides (4000 line)
- Canon CLC 500 Fiery Color Lasers
- Ilford Color Overheads and Prints
- Tektronix Thermal Prints and Overheads
- BBS Information Service (404) 874-4804

Just send us your native files. Files converted to Postscript. Priority Federal Express delivery to you the following morning. Info makes imaging easy. *Slide Imagers*

The BEST PRODUCTS, TECHNICAL SUPPORT, & PRICES Available!

(800) 232-5411 or (404) 874-6740 22 Seventh St. N.E.
Atlanta, GA 30308

CIRCLE 1033 ON READER SERVICE CARD



Wasted High RAM

High loading drivers & TSRs like puzzle pieces that never fit

Even if you use QEMM, 386MAX, DOS 5 or any other memory manager, your PC has wasted high RAM. How does your PC use that wasted RAM? It doesn't! Unless you have Memory Commander. Memory Commander is the only 386/486 memory manager that recovers the unused high RAM and adds it to low DOS. Memory Commander automatically loads your TSRs and Drivers and optimizes your high RAM. Then the unused high RAM can be added to low DOS, significantly increasing the standard 640K. You can add as much as 160K for running VGA graphics programs and 280K for running VGA text programs.

Memory Commander

"What a feeling. I'd installed V Comm's Memory Commander ... and was seeing something I had never seen before: 792,636 bytes free. Wow!"
BYTE 9/91

"Wow!" "Memory Commander is an innovative product that will be your best choice if you must have a really large memory pool for DOS."
PC MAGAZINE 2/11/92

"Memory Commander from V Comm. takes the ultimate step."
PC Sources 11/91

"...my computer now comes on...with the proud message: 827,392 total bytes." "What a product! How did I ever live without it?"
U.S. TECH 11/91

Best case VGA examples

System	Extended Memory	Low DOS Memory
M5-DOS 5 QEMM 386MAX	1M	640K
Memory Commander (graphics)	1M	800K
Memory Commander (text)	1M	920K

✓ To get more low DOS than with your current memory manager send FAX its manual's title page. We'll send you Memory Commander for \$49.95.

✓ If you don't have a memory manager and want to start with the best, order Memory Commander for \$99.95.

Beats QEMM. Guaranteed.

We're convinced Memory Commander is the best. If you don't agree, return it within 60 days of purchase for a no-questions-asked full refund.

V Communications, Inc.
4320 Stevens Creek Blvd., Suite 275-PC
San Jose, CA, 95129; FAX 408-296-4441
800-648-8266 or 408-296-4224

U.S.A. shipping \$6 Can & Mex \$10 Other \$18
CA res. add 7 1/4% tax VISA/MC/AMEX
QEMM is a trademark of Quarterdeck Office Systems
386MAX is a trademark of Quarterdeck, Inc.

ONLY ONE THING COULD BE EASIER THAN OUR BAR CODE PRINTING SOFTWARE.

All four StrandWare products are designed to be easy to learn and easy to use. Like Label Matrix™ label and form generation software, which supports most printers and includes built-in data base and Zip + 4 Postnet. And Bar Code Library, a programmer's library that lets you print bar codes from within your own programs. It's easy to like our prices, too. Call (800) 552-2331 The Computer Connection or (715) 833-2331 to find out more.

StrandWare
For Anyone Who's Keeping Track

CIRCLE 1035 ON READER SERVICE CARD

Order Your Office Products OnLine Day or Night with PENNY WISE

- 16,000 Brand Name Office Products at Unbelievable Savings
- Free Demo Disk
- Free Communication Software
- Free Full Color Catalog

To obtain a Free catalog, demo disk and \$10 gift certificate call 1-800-942-3311

PENNY WISE



Place toll free call to us in "PC Magazine"

CIRCLE 1036 ON READER SERVICE CARD

PC CLASSIFIED

DISKETTES

BASF SONY DYSAN

1/4" Tape			
	2000	\$12.60	
5 1/4" DS/DD	37¢	2120	16.00
5 1/4" DS/HD	48¢	6150	17.60
	8mm 2 3Gb	12.80	
3 1/2" DS/DD			58¢
3 1/2" DS/HD			88¢

MEGAsoft

Price per disk in lots of 300. Mail and Match any local or sur.
(800) 222-0490 FAX: (908) 462-5658
POB 6624 Freehold NJ

CIRCLE 611 ON READER SERVICE CARD

Did you know...

PC Magazine is exclusively read by over 900,000+ business buyers and brand specifiers, including computer resellers and consultants.

COMMUNICATIONS/ NETWORKING

MULTI-LINE PC-DOS 88S

The Bread Board System (TBBS) Secure reliable, full-featured commercial Information system for IBM and compatibles. Menu editor allows customization by nonprogrammers. Kermil, X, Y & Z-Modem. High performance allows up to 64 simultaneous callers. Up to 38,400bps dBASE module available. eSoft, Inc.
15200 E. Girard Ave. #2550
Aurora, CO 80014
(303) 699-6565

EXPANSION UNITS

DATA BASE

BORLAND/ASHTON-TATE

dBase IV V. 1.5	
US List Price.....	\$795
Lowest Market Price.....	\$434
Our Price.....	\$369
dBase III Plus V. 1.1	
US List Price.....	\$695
Lowest Market Price.....	\$395
Our Price.....	\$320
Paradox V. 3.5	
US List Price.....	\$795
Lowest Market Price.....	\$400
Our Price.....	\$369

Many other Borland/Ashton-Tate and Lotus Products available. Call for your special pricing!

E. & E. Software

448 Ignacio Blvd., Suite 265, Novato, CA 94949-USA
800-484-9795 Security code 1112

CIRCLE 615 ON READER SERVICE CARD

DATA ENTRY

Replace dedicated data input systems
Front-end mainframe applications

KeyEntry III

- LAN or stand-alone environments
- ScreenPainter and MenuManager included
- Batch Control System and Reformat utility
- Spanish, German, and French versions
- Outstanding customer support
- Thousands of users worldwide
- OS/2 version

800-533-6879

FREE DEMO DISK
AVAILABLE TO
QUALIFIED COMPANIES



SOUTHERN COMPUTER SYSTEMS, INC.
(205) 251-2985 • FAX (205) 332-4851
In UK SCS Europe, Ltd. 0753-16550/FAX 0753-36765

VIKING DATA ENTRY

Professional Quality Software

- Used by U.S. Census
 - Advanced validation
 - Sequential/ISAM files
 - MS/DOS, UNIX, XENIX, VMS, AIX
 - Technical support
 - Re-key verify
- Viking Software Services
4808 E. 67th St., Ste. 100
Tulsa, OK 74136
800-324-0595 FAX: 918-494-2701

Classified Advertising
Information
(800) 825-4237

INFINITY

MEMORY PRODUCTS & UPGRADES

"Your PC Magazine Memory Source for 4 years!"



GRAMS

	100NS	80NS	70NS
1MB X 1:	\$3.95	\$4.20	
256K X 4:	4.75	5.00	
256K X 1:	1.25	1.35	1.50
64K X 4:	1.25		

*Listed prices on 60NS DRAM

IBM TYPE SIMMS/SIPPS

	80NS	70NS	60NS
4MEG X 9:	\$115	\$125	\$135
1MEG X 9:	32	35	38

3-CHIP: 1MEG X 8: 29 32 35

72-PIN SIMMS

1MB X 36 80NS	4MB	\$175
1MB X 36 70NS	4MB	\$175

MATH COPROCESSORS

80387/387-16	\$95	\$89
80387/387-25	\$99	\$89

PS/2 UPGRADES

30/286		
512K/2 MB KIT	\$29/95	
355X, 405X, 602, 665X, 701		
1 2 MB	\$51/85	
70-A21/A61 70-B21/B61		
2 MB	\$99	
355X 405X 555X 655X/LS		
4 MB	\$159	
355X/LS 405X		
9 MB	\$345	
575X/90: 95		
8 MB	\$345	
90: 95: P75 (Install in Pair)		
2 4 MB	\$99/169	
EXP BRD 50-582, 60, 555X, 655X		
2 4 MB w/2 MB	\$259	
2 4 MB w/2 MB	\$375	
EXP BRD All Models 70 & 80		
2 14 MB w/2 MB	\$299	
4 16 MB w/4 MB	\$385	

PS/2 LAPTOPS

PS/2 LAPTOPS		
2 4 MB	\$89/169/339	
PS/2 UPGRADES		
512K/2 MB	\$45/99/179	

LAPTOP UPGRADES

COMPAQ		
LTE 206		
2 4 MB	\$105/205	
LTE 306S/20		
4 MB	\$245	
LTE LITE 306 20/25		
2 4 MB	\$179/279/549	
SLT 306S/20		
4 MB	\$129/209	
TOSHIBA		
1000LE, 2000SX/SXE 2200SX		
2 4 MB	\$115/205/385	
1200XE, 1600, 3100E		
2 MB	\$99	
3100SX, 3200SX/XXC		
2 4 MB	\$99/169	
4400SX, 6400		
2 4 MB	\$195/305/595	
5200 5200C 5500		
3 MB	\$189/349	
AST EXECUTIVE	\$ LOWEST	
DEL 212N & 320N	\$ LOWEST	
EVEREX TEMPO	\$ LOWEST	
TI TRAVELMATE	\$ LOWEST	

DESKTOP UPGRADES

COMPAQ DESKPRO		
206E, 306-20/20E, 25/25E		
4 MB	\$185	
306S/16		
4 MB	\$165	
306-20E/25E 306S/16		
4 MB	\$239	
206M 306M 306SX/20 406M		
4 MB	\$95/169	
306/33L 406 25/33L SYS PRO		
2 0 MB	\$105/325	
AST PREMIUM		
306C, 306-16		
4 MB	\$195	
PREMIER 306SX/20, 306SX/16		
4 MB	\$169	
ALL PREMIUM AND BRAVO 486		
4 MB w/5MB	\$339	
DELL 386 & 486	\$ LOWEST	
HP VECTRA	\$ LOWEST	
GATEWAY 2000	\$ LOWEST	
MAGNAVOX 386 & 486	\$ LOWEST	
PACKARD-BELL 386	\$ LOWEST	
NEC POWERMATE	\$ LOWEST	

LASER PRINTER UPGRADES

HP II, MD, MP, ME, MD, MP+		
2 4 MB	\$195/175	
HP IIe/II	\$ LOWEST	
PANASONIC 4420, 4450i		
2 4 MB	\$119/189	
PANASONIC 4410/4430 \$ LOWEST		
IBM 4019 4019e		
4 MB	\$79/119/179	
IBM 4029	\$ LOWEST	
EPSON EPL6000 TOSH PGLASER		
2 4 MB	\$115/185	
EPSON ACTNLSR II	\$ LOWEST	
OKI 4000		
1 2 MB	\$80/115	
TI MICROLASER		
1 MB	\$65	
CANON LBP NEC SW \$ LOWEST		

TERMS & CONDITIONS

- 30 Day Return Policy - Unopened
- All equipment must be returned in original condition
- Minimum 5% restocking fee on all returns
- Shipping & handling charges extra
- Payment in full required at time of purchase
- Prices subject to change without notice
- Not valid on previous orders

INFINITY

Memory Products & Upgrades
633 Post Street, Box #197
San Francisco, CA 94109-9215

"MEMORY HOTLINE"

1 (800) 444-7785
(415) 398-2987 Fax: (415) 398-5402

CIRCLE 612 ON READER SERVICE CARD

PRINTERS

SAVE ON HP!!

PartJet XL	\$895	LaserJet	CALL
DeskJet	CALL	7470 Plotter	\$290
DeskWriter	\$225	7440 Plotter	\$600
RuggedWriter	\$890	7475 Plotter	\$750
ScanJet	\$550	7500A Plotter	\$950

All above equipment terms or used with warranty
Call for other HP equipment not listed

SPECIAL!! PAINTJET XL \$895

Color ink jet printer prints up to 16.8 million colors using 9.5 x 11" paper or 11" x 17" paper (parallel and serial ports, optional HP-GL/II and added font capability. PaintJet XL for Macintosh also available. Demonstrator model with 90 day warranty.

LASER PRINTER MEMORY

HP LaserJet Panasonic, Epson IBM 4019 and 4029 Ti Odata OMS. Call for our current low prices.
DESALITE FON15 \$35 Cartridges 22706A 227061 227062 227063 227064. Self-form, 22706C Toner Remain & Pellets. 22706D Unusual. Where to check out. 22706E MEMORY - MS

WE BUY USED EQUIPMENT

Please call purchasing at (519) 449-7974 if you have used HP or other equipment for sale.

COMPUTER BUSINESS MART, INC.

800-441-1491
10215 Buena Vista Ave. Suite A • San Jose, CA 95071
(510) 449-9040 • FAX: (510) 449-7929
International orders welcome

CIRCLE 614 ON READER SERVICE CARD

SOFTWARE/ ACCOUNTING

dBASE ACCOUNTING TOOLS

- *General Ledger
 - *Invoice & A/R
 - *Service Billing
 - *Job Costing
 - *Purch Ord/Inventory
 - *Bill of Materials
 - *Accts Payable
 - *Sales Analysis
 - *Order Entry
 - *Job Estimating
 - *Payroll
 - *Laz-Forms
- \$99 ea + s+h w/dBASE 3+ or 4 Source Code
DATAMAR SYSTEMS
8586 Miramar Place
San Diego, CA 92121
(619) 452-0044 MC, Visa, AX, CH, COD

Calling about an ad?

Say you saw it in
**PC Magazine
Classified**

ICs PROMPT DELIVERY!!!!

SAME DAY SHIPPING (USUALLY)

Memory for IBM PC & compatibles

Memory for IBM PC & compatibles

Memory for IBM PC & compatibles

Memory for IBM PC & compatibles

Memory for IBM PC & compatibles

Memory for IBM PC & compatibles

Memory for IBM PC & compatibles

Memory for IBM PC & compatibles

Memory for IBM PC & compatibles

Memory for IBM PC & compatibles

Memory for IBM PC & compatibles

Memory for IBM PC & compatibles

Memory for IBM PC & compatibles

Memory for IBM PC & compatibles

Memory for IBM PC & compatibles

Memory for IBM PC & compatibles

Memory for IBM PC & compatibles

Memory for IBM PC & compatibles

Memory for IBM PC & compatibles

Memory for IBM PC & compatibles

Memory for IBM PC & compatibles

Memory for IBM PC & compatibles

Memory for IBM PC & compatibles

Memory for IBM PC & compatibles

Memory for IBM PC & compatibles

Memory for IBM PC & compatibles

Memory for IBM PC & compatibles

Memory for IBM PC & compatibles

Memory for IBM PC & compatibles

Memory for IBM PC & compatibles

Memory for IBM PC & compatibles

Memory for IBM PC & compatibles

Memory for IBM PC & compatibles

Memory for IBM PC & compatibles

Memory for IBM PC & compatibles

Memory for IBM PC & compatibles

Memory for IBM PC & compatibles

Memory for IBM PC & compatibles

Memory for IBM PC & compatibles

Memory for IBM PC & compatibles

Memory for IBM PC & compatibles

Memory for IBM PC & compatibles

Memory for IBM PC & compatibles

Memory for IBM PC & compatibles

Memory for IBM PC & compatibles

Memory for IBM PC & compatibles

Memory for IBM PC & compatibles

Memory for IBM PC & compatibles

Memory for IBM PC & compatibles

Memory for IBM PC & compatibles

Memory for IBM PC & compatibles

Memory for IBM PC & compatibles

Memory for IBM PC & compatibles

Memory for IBM PC & compatibles

Memory for IBM PC & compatibles

Memory for IBM PC & compatibles

Memory for IBM PC & compatibles

Memory for IBM PC & compatibles

Memory for IBM PC & compatibles

Memory for IBM PC & compatibles

Memory for IBM PC & compatibles

Memory for IBM PC & compatibles

Memory for IBM PC & compatibles

Memory for IBM PC & compatibles

Memory for IBM PC & compatibles

Memory for IBM PC & compatibles

Memory for IBM PC & compatibles

Memory for IBM PC & compatibles

Memory for IBM PC & compatibles

Memory for IBM PC & compatibles

Memory for IBM PC & compatibles

Memory for IBM PC & compatibles

Memory for IBM PC & compatibles

Memory for IBM PC & compatibles

Memory for IBM PC & compatibles

Memory for IBM PC & compatibles

Memory for IBM PC & compatibles

Memory for IBM PC & compatibles

Memory for IBM PC & compatibles

PC CLASSIFIED

DATA ENTRY

Front-End to Host Applications

- End-user data entry
- Replaces key-to-disk systems
- Menu-driven edit selection
- Easy form design
- International distributors
- Toll-free support hotline

DATALEX 800-962-8888
CIRCLE 616 ON READER SERVICE CARD

415 362 4466 FAX 415 362 5733
From Canada 800 848 5548

ENTRYPOINT

ENTERTAINMENT/GAMES

NO HOURLY
CONNECT
OR LONG
DISTANCE
CHARGES!

Where Adults Come To Play!

ODYSSEY ONLINE

- Local Numbers Covering 850 U.S. Cities!
- CB-Style Group and Private CHAT!
- Special Womens Groups!
- Multiplayer Games! Giant Message Bases!

- Thousands Of Shareware Programs!
- Online Shopping/Travel/Reservations!
- Matchmaker Datingbase! Plus More!

For Info, Signup, Or Local Number Call

818 358-6968

By Modem 8/N/1. Must Be Over 18.

CIRCLE 620 ON READER SERVICE CARD

THE DATA ENTRY EMULATOR™

Full featured, heads-down entry, with two-pass verification, batch control, output record reformat, operator stats, edit language, customizable menus, help text. Free technical support.

PC from \$395
Also 1st LAN's.
IBM AS/400™.
IBM S/36

FREE trial
206/776-6443
800/356-0203

COMPUTER KEYES
21929 Makah Rd.
Woodway, WA 98070

ENTERTAINMENT/GAMES



SeXXy Software

SeXXy Graphics with SOUND!

Our EXCLUSIVE 256 color VGA graphics TALK and PLAY MUSIC through your standard speaker.

- SG10 - Voluptuous Disk** - Exceptionally equipped women TALK to you while you admire their incredible proportions - SIZZLING!
- SG11 - Encounter Disk** - we can't describe the explicit action you will see and HEAR - absolutely INCREDIBLE!
- SG12 - Swimsuit Disk** - You will see the sexiest swimsuits while the girls TALK to you about their tans and turnoffs.
- SG13 - Science Fiction Disk** - You will see incredible space shots and alien encounters while hearing other-worldly descriptions and music.

Each disk is over 1.2MB - plus FREE DISK with over 2.5MB of utilities for printing, cataloging, converting to WINDOWS WALLPAPER, and changing the pictures. Req. VGA with 512K

Prices: One disk \$19, 2 disks \$35, 3 disks \$49, 4 disks \$59. Our Competitors Can't Sell You Pictures That TALK!

SeXXy CD-ROM 600 MB with 5268 VGA pictures, 87 movies, 674 stories, games. Price \$99 \$89 with any CC disk! CD-ROM Bundle 3 Different XXX CD-ROMs \$199

- SeXXyCapades** - The first adult game with TRUE SOUND and 80 sizzling 256 color VGA scenes
- Sexual preference and foreplay options - Play with 2-8 close friends - Over 5MB of pure action!
- Fulfill your sexual desires with new experiences - Find out how your partner would really like to make love
- \$79 - Special Offer \$69 with purchase of any CC disk above - OURS EXCLUSIVELY!

ADD \$3 S/H + 3.5% Or FOREIGN ORDERS ADD \$2/DISK + IN PA ADD TAX + MUST STATE AGE OVER 21

VISA/MC Orders Only: 800-243-1515 Ext. 600CB

24 HRS/7 DAYS - Or CK/MO to: SeXXy Software, 2880 Bergey Rd., Dept 600CB, Hatfield, PA 19440

CIRCLE 617 ON READER SERVICE CARD

XXX-RATED CD-ROM

Must state age 21 Other Products Available

Private Pictures I \$59.88

The easiest to use adult CD-ROM, completely menu driven. Contains over 600 sharp 640x480x256 images and 70 hot VGA movies. Includes DOS & Windows

Volcano (R to X rated) \$99.88

The Volcano has over 900 different Super VGA 1024x768x256 color images. All images are new and model-released. You will not find these images on any other CD-ROM. DOS utilities included.

CIRCLE 618 ON READER SERVICE CARD

Adults Only.

Meet Goldie and 24 other models on the BodyCello 5-disk (3.5" disks)

Sampler Set. Includes

25 color images in

GIF, a picture

viewer, and your

FREE BodyCello

catalog.

Part #3-10, \$39.95

add \$4.75 for s/h

OR Send \$5.00 to

receive your

BodyCello adults

only 4-color

catalog.

Orders: BodyCello

P.O. Box 910531 • Sorrento Valley, CA 94131

CIRCLE 619 ON READER SERVICE CARD

Classified Advertising Information

(800) 825-4237

To place your ad in

PC MAGAZINE CLASSIFIED

Call **(212) 503-5115** or **(800) 825-4237**

GRAPHICS

Computer Images



Use toll-free 800 # to sign up with credit card. Once verified use same 800 # to download files.

1-800-GO-MODEM

Or use direct dial 64 Line BBS at (503) 697-5100 B/N/1

SuperVGA 1024x768x256

**ASTRONOMY • HUGE ADULT AREA
SCENIC • GRASP • ANIMATOR • 3D
STUDIO MOVIES • SOUND • GAMES
UTILITIES • IMAGE CONVERTERS**

Event Horizons Commercial BBS, thousands of images and movies. Must be 21 to download from adult areas. Quality Color SuperVGA/VGA/EGA 1200/ 2400 bps \$12/hr., 9600 bps \$48 hr., 800# \$8/hr. extra. Also Professional Image Scanning from prints or slides to disk.

No Modem? Order our Mail Image Library with samples \$9. World-wide shipment. Info voice line 503-697-7700. All credit cards accepted. Same day shipment.

Event Horizons

311 Ave. B, Ste. 209

Lake Oswego, OR 97034

Voice 503-697-7700, BBS 800-

466-6336, or BBS 503-697-5100

CIRCLE 621 ON READER SERVICE CARD

EDUCATION

B.S. & M.S. in Computer Science

• ALL COURSES BY CORRESPONDENCE

- Increase your earning power
- Join students from leading computer companies
- Most courses fully interactive

**AMERICAN INSTITUTE
COMPUTER SCIENCES**

For free information call
1-800-767-AICS

ENGINEERING

SIMULATION

GPSS/PC is a full-power version of GPSS, the most popular mainframe simulation language. Specifically designed for interactive use on today's high-speed microprocessors, it is loaded with features such as interactive graphics and animation. Using GPSS/PC, you can predict the behavior of complicated real world systems. MINUTEMAN SOFTWARE
P.O. Box 171/B
Stow, MA 01775
800-223-1430/508-897-5662 Ext.316

Calling about an ad?
Say you saw it in
**PC Magazine
Classified**

GRAPHICS

Sep-FreeSM Color Short Run Printing

quality without plates & separations

Slides from \$3.00

Scans, Overheads

Mastercard/Visa - 24 Hr. Service

Elegant Graphics
750 Princeton Ave., Box 774607
Steamboat Springs, CO 80477
(303) 879-4334, FAX (303) 879-5206
Modem/BBS (303) 879-5210

CIRCLE 622 ON READER SERVICE CARD

MAILING PROGRAMS

MAIL ORDER MANAGER (M.O.M.)

The complete solution for the mail order business—order entry/review, credit card processing, UPS manifesting, profit analysis, G/L accounting, list management. Clipper compiled, dBase III+ files. Find out why more people buy M.O.M. after comparing. Single Station and Network Systems
DydaComp Development Corporation
150 River Road, Suite N1
Montville, NJ 07045
1-800-858-DMOM

The Mail Order Wizard

Complete management system for a catalog, inbound telemarketing, or mail order company. Order processing, inventory mgt, ad forecasting, sales/banking, list mgt, modern charge approval, EDC, UPS manifest w/scale. Single and MultiUser systems. Inbound/Outbound Editor's Choice!

The Haven Corporation
802 Madison St., Dept M491
Evanston, IL 60202
800/782-8278, 708/869-3434

Did you know...

PC Magazine is exclusively read by over 900,000+ business buyers and brand specifiers, including computer resellers and consultants.

83% of PC Magazine's subscribers have purchased or authorized the purchase of PC products from direct marketers in the last 12 months.

MUSIC

PC MIDI for PC Musicians

Make the most of your music with our MIDI interface cards for your PC. Perfect for your favorite notation, sequencing, recording, and music instruction programs. Call the experts



Music Quest

1-800-876-1376

1700 Alma Dr #330, Plano, TX 75075 (214) 881-7408 Fax (214) 422-7094

CIRCLE 623 ON READER SERVICE CARD

PUBLIC DOMAIN/ SHAREWARE

FREE
CATALOG

Call
Toll Free

1-800-447-2181

PC SHAREWARE

ASP Member

619-272-6673

1763 Garnet Ave. • San Diego, CA 92109

CIRCLE 624 ON READER SERVICE CARD

FREE - 15 DISKS OF OUR BEST SELLING SOFTWARE

FREE! Receive 53 games,
88 WindowsTM programs, or
36 educational programs.

Each collection comes on

15 disks

PAY \$5.00 SHIPPING AND

HANDLING PER COLLECTION

Foreign add \$5.00 per package.

Credit card only!

SMC SOFTWARE PUBLISHERS

(619) 931-8111 EXT. 511

CIRCLE 625 ON READER SERVICE CARD

To place your ad in

**PC MAGAZINE
CLASSIFIED**

Call (212) 503-5115

or (800) 825-4237

SALES MARKETING

Sales Forecasting

New forecasting tool is as fast as a spreadsheet, and easier to use than statistical tools! Toll FREE info line:
800-472-6183. Call now! FREE info!



FuzyWare, Inc.

Knoxville, TN

CIRCLE 627 ON READER SERVICE CARD

SECURITY

PROTECT YOUR SOFTWARE TODAY

Since 1986, thousands of companies worldwide have chosen Az-Tech Software as partners in their fight against Software Pirates. Why? Because Az-Tech offers you:

DATE & EXECUTION LIMITS COMPRESSION
ENCRYPTION SERIALIZATION* REMOTE RESET

All of this and now our newest releases in both Hardware and Software based protection:

EVERLOCK 3.0

- * OPTION BOARD SAFE
- * CPU LOCK
- * REMOTE REGISTRATION
- * CD ROM LOCK
- * WINDOWS COMPATIBLE

with over 14 new features you have asked for over the years. If Software based protection is what you need, don't settle for anything less than EVERLOCK 3.0.

These systems are easy to use and most importantly, they work! No other product can provide the Compatibility, Flexibility, Ease of Use and Degree of Protection that you receive with Az-Tech products.

Call Today For A FREE DEMO

1-800-227-0644

Az-Tech Software, Inc.

201 East Franklin, Suite 11 Richmond, MO 64085

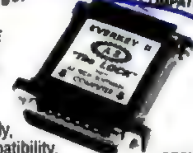
(816) 778-2700 LEADERS IN SOFTWARE SECURITY FAX (816) 778-8398

CIRCLE 628 ON READER SERVICE CARD

EVERKEY LOCKS

We have combined the Versatility of Az-Tech Software and the ONE WIRE Hardware Compatibility of Dallas Semiconductor in this new package.

EASE
OF
USE



SECURITY

BIT-LOCKSM SECURITY

Piracy SURVIVAL 8 YEARS proves effectiveness of powerful multilayered security. Rapid decryption algorithm. Device transparent to PARALLEL or SERIAL port. Complimented by low cost KEY-LOCKSM multifunctional COMPU-LOCKSM Countdown, timeout, data encoding, multi-product protection, DOS/UNIX. Access control MICROCOMPUTER APPLICATIONS
3167 E. Otero Circle
Littleton, CO 80122
(303) 770-1917

RELIGION

CHURCH SOFTWARE

Discover for yourself why more churches are choosing **PowerChurch PlusSM**.

Try out the leading membership and accounting package.

Call today for your **FREE** full-working **DEMO**.

F1 SOFTWARE, 208 Ridgfield Drive, Asheville, NC 28806

(800) 486-1800 (704) 665-1818

CIRCLE 626 ON READER SERVICE CARD

SECURITY

STOP SOFTWARE PIRACY

Now Networked



Developers Say...
"NET Hardlock's interface allows me to easily limit the number of simultaneous users without having to build this up myself. Since NET Hardlock contains an algorithmic response ASIC, I'm assured of the highest level of copy protection effectiveness."



Accountants Say...
"NET Hardlock is a welcome addition to the Hardlock family of revenue protection products. Now limiting and expanding the simultaneous user portion of the license agreement is the easy part! Our costs are lowered and the end user benefits - what else can you say other than it's a perfect solution!"



End Users Say...
"NET Hardlock is the easiest protection system I've ever used! Once the NET Hardlock is plugged in, I don't even know it's there. Now the application can find the NET Hardlock regardless of which PC I'm using. We can easily add more users to the license without shipping Hardlocks back and forth."



The only product that combines a memory option with programmable, algorithmic response - all in one compact unit.

Made in the USA

Other products in the Hardlock Family
Hardlock & Hardlock with Memory (Single User)
Hardlock & DES (Data Security)
Hardlock SE (Workstations)

Supporting DOS, Windows, OS/2, Xenix

HARDLOCK™
The Preferred Protection System!
1-800-562-2543

Call for your 30-Day No-Risk Evaluation Kit.



270 Lexington Drive Buffalo Grove, Illinois 60089-6930
708/808-0300 Fax: 708/808-0313

For a distributor in Europe contact Fast Electronic GmbH, Tel: 49-89-538-800-0 Fax: 49-89-539-800-40

CIRCLE 629 ON READER SERVICE CARD

Did you know...

PC Magazine Classified generated a whopping \$200 million in sales revenue for its advertisers, resulting in these expenditures—

- Over \$52 million in applications software
- Over \$52 million in computer systems
- Over \$22 million in supplies
- Over \$12 million in systems
- Over \$61 million in peripherals
- Over \$500,000 in consulting services
- Over \$8.9 million in other computer products and services

UTILITIES

HARDWARE LOCKS GIVING YOU TROUBLE

The Intelligent Printer Port will provide absolute insurance against down time due to lock device problems. The hardware solution provides a much more reliable source of protection. Emulates the lock device 100% electronically, no resident software or device drivers required. 1 year warranty, 30 day money back guarantee.

Products start as low as \$250.00

For more information call:
SafeSoft Systems Inc.
202-1100 Concordia Ave.
Winnipeg, MB
Canada R2K 4B8
PH (204) 669-4639
FAX (204) 668-3566

CIRCLE 630 ON READER SERVICE CARD

Classified Advertising Information
(800) 825-4237

MISCELLANEOUS/ BAR CODING

BAR CODING

ITS BAR CODE READERS MORE FEATURES MORE AFFORDABLE



NEW IMPROVED
Starting at \$279 with wand! • Transparent operation. • No software required • PC, XT, AT, Mac, PS2, others. Look into our full line of reliable, competitively priced readers, keyboard and serial wedges, portable data collectors, multi-drop readers, wands, laser scanners, mag stripe readers, and bar code printing software • OEM and reseller discounts. We provide solutions to systems! Custom application software for Data Collections available. Call for details.

INTERNATIONAL TECHNOLOGIES & SYSTEMS CORP.

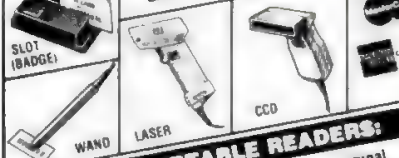
9201 Forest Hill Ave., Suite 108
Richmond, VA 23235 (804) 272-0138
FAX (804) 272-0357
655-K North Berry St. Brea, CA 92621
(714) 990-1880 • FAX (714) 990-2503
CIRCLE 631 ON READER SERVICE CARD

BAR CODE READERS AMERICAN MICROSYSTEMS

2190 A Regal Pkwy. • Euless, Texas 76040 • (817) 571-9015

FOR PC, XT, AT, PS/2 & TERMINALS:

- No software changes required
- Data appears as keyboard input
- Reads Code 39, 1-2of5, UPC/EAN
- Codabar, 128, 93, 11, MSI/Plessey
- Auto-discriminates between codes
- Accepts WAND, SLOT, CCD, LASER, MAG STRIPE



PORTABLE READERS:

- Use as a portable, wedge or terminal
- Input Devices: WAND, CCD, or 5V LASER
- Real-time clock for date and time stamps
- Automatic power off with resume

BAR CODE PRINTING SOFTWARE:

- For Epson, OKI, IBM, Dot Matrix and HP LaserJet Printers.
- Prints Code 39, 1-2of5, UPC/EAN, Codabar, 128, 93, 11, MSI/Plessey
- Easy to use

• "Built-in" program generator
• Multiple programs & data files
• "Built-in" inventory programs
• 54 key alpha/numeric keyboard
• Supports Hayes compatible modems

(800) 649-4452 • FAX: (817) 571-9022
30 Day Money Back Guarantee
One Year Warranty

Calling about an ad? Say you saw it in
PC Magazine Classified

BAR CODING

DATA CONVERSION

WORTHINGTON

BAR CODE HEADQUARTERS

DATA SOLUTIONS OFFICES IN USA AND EUROPE

QUALITY • SERVICE • 800 SUPPORT

LABELS LABELING SOFTWARE

- For Epson, Oki, IBM, and LaserJet.
- Flexible design. Any Format or size.
- On-Screen Label Design, WYSIWYG.
- 16 text sizes — 3" reads at 100'
- Bar codes: 2of5, 128, UPC/EAN, AIAG, MIL-STD, ZIP+4, and Code 39

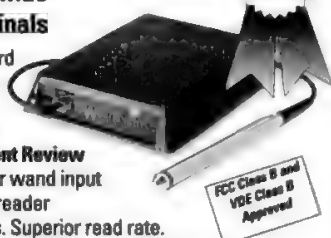
- Auto-incrementing. File input. Logos, symbols — from your scanner.
- Reversals, color, soft fonts. Powerful, Versatile, Fast, Easy!
- Rotatable, shadable, scalable fonts from 0.1" to 13" on LaserJet III
- Above label printed with LabelRIGHT™ — \$279
- Sato, Zebra & Prodigy version — LabelRIGHT Thermal — \$479
- Other menu driven programs from \$129. SCO/UNIX — \$199



BAR CODE READERS

for PC, XT, AT, PS/2, Mac
and all RS-232 Terminals

- Attaches as 2nd keyboard
- No software changes
- 2of5, UPC/EAN, 128, Codabar, MSI, Code 39
- Top Rated by Independent Review
- Magstripe, laser, CCD, or wand input
- 1 or 2 input devices per reader
- 100 configurable options. Superior read rate.
- Complete with PSC or Symbol laser gun — \$1369
- Complete with steel wand — \$399



PORTABLE READERS

- Battery operated. Simple, Flexible, Powerful
- 64K — 256K memory. Bar code or key input
- Big Rubber Keys. Date/Time Stamping
- Operates as Portable, Wedge, or Terminal
- Built-in Generator for Easy Programming
- 2 Built-in Inventory Programs or 3 User Written
- Upload Programs Furnished or use Xmodem
- 3 Data Files — 3 Tables for Verification
- Wand, CCD or Laser input
- Complete 64K units with wand — \$799

Same Day Shipping! • Made in the USA • 2 Year Warranty on Wand and Decoder

European Office:

Nüßlistrasse 11
9050 Appenzell, Switzerland
71 87 51 15 • 71 87 51 17 Fax

USA Headquarters:

417 Ingalls Street
Santa Cruz, CA 95060
408-458-9338 • 408-458-9964 fax

Worthington Data USA or Canada

800-345-4220
30 Day Money Back Guarantee!

In Europe, Call Information for Toll-Free Number to Swiss Office

CONVERTING YOUR DISKETTES?

ENTRUST THEM TO US
2500 Word Processor & Computer
formats 3½", 5¼", 8" DISKS,
MAGTAPES, MAGCARDS,
CARTRIDGES, CASSETTES, 8MM

DISK DUPLICATION OCR SCANNING SERVICES

Customized conversions too!
Call us for quality, best prices and
quickest turnaround time

COMPANY COMPENDIA, INC.

(800) 374-DISK
or (312) 419-8771 FAX: (312) 419-1390
CIRCLE 633 ON READER SERVICE CARD

America's Leaders in Conversions

- Over 3500 formats, most in industry
- Highest quality, fastest turnaround
- Diskettes, tapes, cartridges, 8/4MM
- Optical scanning & data entry
- Disk/tape duplication, custom work
- Word processors/mail lists/databases
- IBM, DEC, WANG, UNIX, Mac, XEROX, etc
- NATIONAL DATA CONVERSION INSTITUTE
5 East 16th St
New York, NY 10003
(212) 463-7511

QUALITY CONVERSIONS

- Convert IBM, CPT, MAC, DEC, NBI, WANG,
LANIER, XEROX, VYDEC, 3000+ others
Customization available
- 9-Track and most Cartridges
- Scanning - OCR / IMAGES
- Databases, Mail lists, Spreadsheets
- BEST RATES • FAST • FREE TEST
1st RUN COMPUTER SERVICES INC
1261 Broadway, Suite 508
New York, NY 10001
(212) 779-0800 • (800) 833-2207

Calling about an ad?

Say you saw it in

**PC Magazine
Classified**



BAR CODE & MAGNETIC STRIPE READERS For PC/XT/AT, PS/2, and RS-232 Interface

- Direct keyboard interface, no software change
- Reads UPC, EAN, Code 39, 11, 128, 125, Codabar, MSI
- Direct from manufacturer 30 day money back guarantee
- Reader with plastic wand — \$245; with steel wand — \$295
- with Magnetic Stripe scanner — \$295
- Bar Code Labeling software from \$50
- Reseller discount available direct from manufacturer

16031 Kaplan Ave
City of Industry, CA 91744
Tel (818) 968-6265
Fax (818) 968-5527

CIRCLE 632 ON READER SERVICE CARD

PC Magazine Classified

is #1 in classified ad lineage in
IBM-Standard computer publishing.
Join the winning team and place your ad.
Call (212) 503-5115 or (800) 825-4237

Did you know...

PC Magazine is exclusively read by over
900,000+ business buyers and brand specifiers,
including computer resellers and consultants.

83% of PC Magazine's subscribers have
purchased or authorized the purchase of PC
products from direct marketers in the last
12 months.

Get all the facts. Call your PC Magazine
Marketplace Account Representative for more
information or to place your ad, 212-503-5115 or
800-825-4237.

PC CLASSIFIED

DATA RECOVERY SERVICES

Lst yr dta?

We can find it.

- Unsurpassed Success Rate
- Fast Turn Around
- Professional Clean Room
- Expertise with Novell, DOS, Macintosh, OS/2, Unix, Xenix, Sun, DEC, Wang, Banyan Vines, and More!
- Service Also Available on Tape Backups, and for Bernoulli, SyQuest, and Other Removable Media

1-800-872-2599

612 937-5161 • FAX 612 937-5750
CA: 1-800-752-7557 • U.K.: 44-81-974 5522



Ontrack

DISK CONVERSION

DATA CONVERSION

If you want the most complete conversion services in the industry, just call...



(800) CONVERT

Capabilities include over 3000 formats

PIVAR COMPUTING SERVICES, Inc.®

185 Arlington Heights Rd. #M
Buffalo Grove, IL 60089
(708) 459-6010

Did you know...

PC Magazine is exclusively read by over 900,000+ business buyers and brand specifiers, including computer resellers and consultants.

Classified Advertising Information

(800) 825-4237

What PC Magazine Classified is all about—

BIG CIRCULATION.

An astounding audience of 900,000+ brand specifiers, more PC product buyers than any other publication delivers. Virtually every PC Magazine subscriber has the expertise and authority to specify brands of personal computers for their companies.

BIG SCOPE.

Advertising in PC Magazine Classified works in a big way. PC Magazine's enormous scope is one reason—but there are many other big reasons why advertising campaigns succeed in PC Magazine Classified. PC Magazine Classified takes advertisers' volume sales message to the biggest audience, and supports that message in an editorial environment that encourages direct response buying.

DISKETTE COPY SERVICES

SOFTWARE DUPLICATION

Service
Disks & Tapes
Custom Packaging
Custom Printing

MEGAsoft
(800) 222-0490
FAX (908) 462-5658

Equipment
Disk Duplicators
Labelers & Sleevers
Maintenance

CIRCLE 634 ON READER SERVICE CARD

SOFTWARE

- ◆ Highest Quality Media
- ◆ Competitive Pricing
- ◆ 24 Hour Turnaround
- ◆ Total Quality Assurance
- ◆ Custom Labels & Packaging
- ◆ Excellent Service

We Also Sell Duplication Equipment

DUPLICATION

(800) 426-0247

PRINCETON DISKETTE

1104 Richmond Ave. • P.O. Pleasant Bch., NJ 08122

CIRCLE 635 ON READER SERVICE CARD

DUPLICATION FROM \$.54 HIGHEST QUALITY MEDIA

MSDOS duplication from **\$.54** per disk, and **\$.88** (3.5") Prices go even lower as you continue to order!

- 3.5" High Density
- 3.5" Low Density
- 5.25" High Density
- 5.25" Low Density
- 8" High Density
- 8" Low Density
- 8" High Density
- 8" Low Density
- 8" High Density
- 8" Low Density

800-255-3142

Diversified Systems Group, Inc
PO Box 1114, Issaquah WA 98027

CIRCLE 639 ON READER SERVICE CARD

INSURANCE



SAFWARE

INSURES YOUR COMPUTERS

Full replacement of hardware media purchased software As low as \$49 yearly Covers fire theft power surges other accidents Blanket coverage no list of equipment needed Call for information or immediate coverage

1-800-848-3469
Local (614) 262-0559

SAFWARE The Insurance Agency Inc
2929 N High Street P.O. Box 02211
Columbus, OH 43202

CIRCLE 636 ON READER SERVICE CARD

Did you know...

PC Magazine Classified generated a whopping \$200 million in annual sales revenue for its advertisers, resulting in these expenditures—

- Over \$52 million in applications software
- Over \$52 million in computer systems
- Over \$22 million in supplies
- Over \$12 million in systems

SUPPLIES

TONER CARTRIDGES REMANUFACTURED

TESTED • GUARANTEED • 24-HR TURN

- HP, Apple, Canon, etc.
- Canon PC & Sharp Z-Copiers
- IBM 4019 - 4 Colors!

Prices From

\$45

Send empty cart. with wand.

MICR Toner, Software, & Fonts
HP2, 3, 3Si

1-800-239-4027

ADVANTAGE LASER PRODUCTS, INC.

1929 Queen City Ave. • Tuscaloosa, AL 35401
2030 Powers Ferry Rd, STE 218 • Atlanta, GA 30339

CIRCLE 637 ON READER SERVICE CARD



THROWING AWAY CARTRIDGES

Recycling from **\$36.00** includes pick-up & delivery
100% guaranteed will not leak, streak or squeak!
• Discount toner for most copy machines.

• Ink refills for Desk Jet, Desk Writer, Bubble Jet

National Toner (800) 676-0749

Recycling & Supply

CIRCLE 638 ON READER SERVICE CARD

IT'S AS EASY AS 1. 2. 3

1. Fill in your name and address and check off your answers to the nine research questions.
2. Circle the numbers on the card that correspond to the ads or articles you'd like more information about.
3. The literature will be mailed to you from the advertiser free of charge.

CIRCLE FOR FREE INFORMATION

Valid after January 31, 1993

SAMPLE FOR FREE INFORMATION										001	002	003	004	005	006	007	008	009	010	011	012	013	014	015	016	017	018	019	020	021	022	023	024	025	026	027	028	029	030	031	032	033	034	035		
036	037	038	039	040	041	042	043	044	045	046	047	048	049	050	051	052	053	054	055	056	057	058	059	060	061	062	063	064	065	066	067	068	069	070	071	072	073	074	075	076	077	078	079	080	081	082
083	084	085	086	087	088	089	090	091	092	093	094	095	096	097	098	099	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129
130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176
177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223
224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270
271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317
318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364
365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411
412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458
459	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480	481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500	501	502	503	504	505
506	507	508	509	510	511	512	513	514	515	516	517	518	519	520	521	522	523	524	525	526	527	528	529	530	531	532	533	534	535	536	537	538	539	540	541	542	543	544	545	546	547	548	549	550	551	552
553	554	555	556	557	558	559	560	561	562	563	564	565	566	567	568	569	570	571	572	573	574	575	576	577	578	579	580	581	582	583	584	585	586	587	588	589	590	591	592	593	594	595	596	597	598	599
600	601	602	603	604	605	606	607	608	609	610	611	612	613	614	615	616	617	618	619	620	621	622	623	624	625	626	627	628	629	630	631	632	633	634	635	636	637	638	639	640	641	642	643	644	645	646
647	648	649	650	651	652	653	654	655	656	657	658	659	660	661	662	663	664	665	666	667	668	669	670	671	672	673	674	675	676	677	678	679	680	681	682	683	684	685	686	687	688	689	690	691	692	693
694	695	696	697	698	699	700	701	702	703	704	705	706	707	708	709	710	711	712	713	714	715	716	717	718	719	720	721	722	723	724	725	726	727	728	729	730	731	732	733	734	735	736	737	738	739	740
741	742	743	744	745	746	747	748	749	750	751	752	753	754	755	756	757	758	759	760	761	762	763	764	765	766	767	768	769	770	771	772	773	774	775	776	777	778	779	780	781	782	783	784	785	786	787
788	789	790	791	792	793	794	795	796	797	798	799	800	801	802	803	804	805	806	807	808	809	810	811	812	813	814	815	816	817	818	819	820	821	822	823	824	825	826	827	828	829	830	831	832	833	834
835	836	837	838	839	840	841	842	843	844	845	846	847	848	849	850	851	852	853	854	855	856	857	858	859	860	861	862	863	864	865	866	867	868	869	870	871	872	873	874	875	876	877	878	879	880	881
882	883	884	885	886	887	888	889	890	891	892	893	894	895	896	897	898	899	900	901	902	903	904	905	906	907	908	909	910	911	912	913	914	915	916	917	918	919	920	921	922	923	924	925	926	927	928
929	930	931	932	933	934	935	936	937	938	939	940	941	942	943	944	945	946	947	948	949	950	951	952	953	954	955	956	957	958	959	960	961	962	963	964	965	966	967	968	969	970	971	972	973	974	975
976	977	978	979	980	981	982	983	984	985	986	987	988	989	990	991	992	993	994	995	996	997	998	999	1000	1001	1002	1003	1004	1005	1006	1007	1008	1009	1010	1011	1012	1013	1014	1015	1016	1017	1018	1019	1020	1021	1022
1023	1024	1025	1026	1027	1028	1029	1030	1031	1032	1033	1034	1035	1036	1037	1038	1039	1040	1041	1042	1043	1044	1045	1046	1047	1048	1049	1050	1051	1052	1053	1054	1055	1056	1057	1058	1059	1060	1061	1062	1063	1064	1065	1066	1067	1068	1069
1070	1071	1072	1073	1074	1075	1076	1077	1078	1079	1080	1081	1082	1083	1084	1085	1086	1087	1088	1089	1090	1091	1092	1093	1094	1095	1096	1097	1098	1099	1100	1101	1102	1103	1104	1105	1106	1107	1108	1109	1110	1111	1112	1113	1114	1115	1116
1117	1118	1119	1120	1121	1122	1123	1124	1125	1126	1127	1128	1129	1130	1131	1132	1133	1134	1135	1136	1137	1138	1139	1140	1141	1142	1143	1144	1145	1146	1147	1148	1149	1150	1151	1152	1153	1154	1155	1156	1157	1158	1159	1160	1161	1162	1163
1164	1165	1166	1167	1168	1169	1170	1171	1172	1173	1174	1175	1176	1177	1178	1179	1180	1181	1182	1183	1184	1185	1186	1187	1188	1189	1190	1191	1192	1193	1194	1195	1196	1197	1198	1199	1200										

1. Do you work in a DP/MIS department?
01. ☐ Yes 02. ☐ No

2. Please indicate your company or organization's primary business activity: (Check one only.)

- 01. ☐ Manufacturer of Computer Equipment, Computers, Software
- 02. ☐ Manufacturer—Aerospace
- 03. ☐ Manufacturer—Other
- 04. ☐ Systems House
- 05. ☐ Computer Consultant
- 06. ☐ Computer Retailer/VAR/VAD Distributor
- 07. ☐ Communications
- 08. ☐ Finance/Banking/Insurance/Real Estate/Accounting
- 09. ☐ Education
- 10. ☐ Government—Federal
- 11. ☐ Government—Non-Federal
- 12. ☐ Research and Development
- 13. ☐ Data Processing/Computer Service
- 14. ☐ Health/Medical/Legal Service
- 15. ☐ Engineering/Architecture

16. ☐ Agriculture/Construction/Mining/Oil/Transportation/Utilities

17. ☐ Non-Computer Retailer/Distributor

18. ☐ Other Business or Service

99. ☐ Other

3. Please indicate your primary business function: (Check one only.)

- 01. ☐ DP/MIS
- 02. ☐ Systems, Programming
- 03. ☐ Communications
- 04. ☐ Engineering
- 05. ☐ Res./Dev./Scientific
- 06. ☐ Accounting/Finance
- 07. ☐ Computer Consulting
- 08. ☐ Purchasing
- 09. ☐ Operations
- 10. ☐ Production
- 11. ☐ Education/Training
- 12. ☐ Marketing/Sales
- 13. ☐ Medical/Legal
- 14. ☐ Admin./Mgmt.
- 99. ☐ Other

4. Is your company a reseller?
01. ☐ Yes 02. ☐ No

5. For how many IBM PCs and compatibles do you specify brands of products:

- 01. ☐ 10 or less 03. ☐ 26-99
- 02. ☐ 11-25 04. ☐ 100 or more

6. Are there any PCs in your office? (Check all that apply.)

- 01. ☐ Linked to mainframe
- 02. ☐ Linked to mini
- 03. ☐ Networked together

7. Please check the equipment currently installed at your location: (Check all that apply.)

- 01. ☐ IBM or Compatible PCs
- 02. ☐ IBM or Compatible Mainframes
- 03. ☐ IBM or Compatible Minis
- 04. ☐ Macintosh
- 05. ☐ CD-ROM
- 06. ☐ Windows

8. Do you plan to buy any PC Products?

- 01. ☐ Now
- 02. ☐ In 4 to 6 months
- 03. ☐ In 7 to 12 months
- 04. ☐ No definite plans

9. Number of Employees in your entire company:

- 01. ☐ 25 or less 04. ☐ 500-999
- 02. ☐ 26-99 05. ☐ 1000 or more
- 03. ☐ 100-499

PLEASE PRINT CLEARLY

Name

Title

Telephone

Company Name

Address

City

State

Zip

☐ Please send me one year (22 issues) of PC Magazine for \$29.97. Offer valid in U.S. only.

Free Product Information

BUSINESS REPLY MAIL

Free Product Information



NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

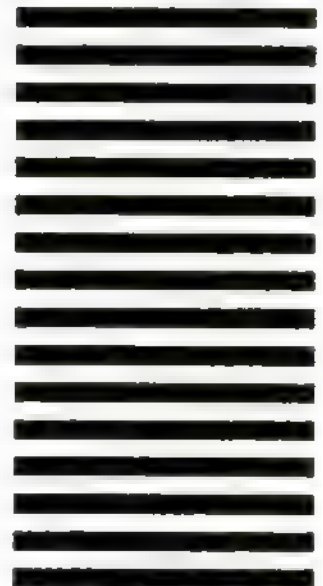
BUSINESS REPLY MAIL

FIRST CLASS MAIL PERMIT NO. 433 RIVERTON, NJ

POSTAGE WILL BE PAID BY ADDRESSEE



P.O. BOX 1687
RIVERTON, NJ 08077-9687



READER SERVICE CARD FREE INFORMATION

IT'S AS EASY AS 1, 2, 3

1. Fill in your name and address and check off your answers to the nine research questions
2. Circle the numbers on the card that correspond to the ads or articles you'd like more information about
3. The literature will be mailed to you from the advertiser free of charge

CIRCLE FOR FREE INFORMATION

Void after January 31, 1993

001	002	003	004	005	006	007	008	009	010	011	012	013	014	015	016	017	018	019	020	021	022	023	024	025	026	027	028	029	030	031	032	033	034	035	
036	037	038	039	040	041	042	043	044	045	046	047	048	049	050	051	052	053	054	055	056	057	058	059	060	061	062	063	064	065	066	067	068	069	070	
071	072	073	074	075	076	077	078	079	080	081	082	083	084	085	086	087	088	089	090	091	092	093	094	095	096	097	098	099	100	101	102	103	104	105	
106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	
141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	
176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	
211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	
246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	
281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	
316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	
351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	
386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	
421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	
456	457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480	481	482	483	484	485	486	487	488	489	490	
491	492	493	494	495	496	497	498	499	500	501	502	503	504	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520	521	522	523	524	525	
526	527	528	529	530	531	532	533	534	535	536	537	538	539	540	541	542	543	544	545	546	547	548	549	550	551	552	553	554	555	556	557	558	559	560	
561	562	563	564	565	566	567	568	569	570	571	572	573	574	575	576	577	578	579	580	581	582	583	584	585	586	587	588	589	590	591	592	593	594	595	
596	597	598	599	600	601	602	603	604	605	606	607	608	609	610	611	612	613	614	615	616	617	618	619	620	621	622	623	624	625	626	627	628	629	630	
631	632	633	634	635	636	637	638	639	640	641	642	643	644	645	646	647	648	649	650	651	652	653	654	655	656	657	658	659	660	661	662	663	664	665	
666	667	668	669	670	671	672	673	674	675	676	677	678	679	680	681	682	683	684	685	686	687	688	689	690	691	692	693	694	695	696	697	698	699	700	
701	702	703	704	705	706	707	708	709	710	711	712	713	714	715	716	717	718	719	720	721	722	723	724	725	726	727	728	729	730	731	732	733	734	735	
736	737	738	739	740	741	742	743	744	745	746	747	748	749	750	751	752	753	754	755	756	757	758	759	760	761	762	763	764	765	766	767	768	769	770	
771	772	773	774	775	776	777	778	779	780	781	782	783	784	785	786	787	788	789	790	791	792	793	794	795	796	797	798	799	800	801	802	803	804	805	
806	807	808	809	810	811	812	813	814	815	816	817	818	819	820	821	822	823	824	825	826	827	828	829	830	831	832	833	834	835	836	837	838	839	840	
841	842	843	844	845	846	847	848	849	850	851	852	853	854	855	856	857	858	859	860	861	862	863	864	865	866	867	868	869	870	871	872	873	874	875	
876	877	878	879	880	881	882	883	884	885	886	887	888	889	890	891	892	893	894	895	896	897	898	899	900	901	902	903	904	905	906	907	908	909	910	
911	912	913	914	915	916	917	918	919	920	921	922	923	924	925	926	927	928	929	930	931	932	933	934	935	936	937	938	939	940	941	942	943	944	945	
946	947	948	949	950	951	952	953	954	955	956	957	958	959	960	961	962	963	964	965	966	967	968	969	970	971	972	973	974	975	976	977	978	979	980	
981	982	983	984	985	986	987	988	989	990	991	992	993	994	995	996	997	998	999	1000	1001	1002	1003	1004	1005	1006	1007	1008	1009	1010	1011	1012	1013	1014	1015	
1016	1017	1018	1019	1020	1021	1022	1023	1024	1025	1026	1027	1028	1029	1030	1031	1032	1033	1034	1035	1036	1037	1038	1039	1040	1041	1042	1043	1044	1045	1046	1047	1048	1049	1050	1051
1052	1053	1054	1055	1056	1057	1058	1059	1060	1061	1062	1063	1064	1065	1066	1067	1068	1069	1070	1071	1072	1073	1074	1075	1076	1077	1078	1079	1080	1081	1082	1083	1084	1085	1086	1087
1088	1089	1090	1091	1092	1093	1094	1095	1096	1097	1098	1099	1100	1101	1102	1103	1104	1105	1106	1107	1108	1109	1110	1111	1112	1113	1114	1115	1116	1117	1118	1119	1120	1121	1122	1123
1124	1125	1126	1127	1128	1129	1130	1131	1132	1133	1134	1135	1136	1137	1138	1139	1140	1141	1142	1143	1144	1145	1146	1147	1148	1149	1150	1151	1152	1153	1154	1155	1156	1157	1158	
1159	1160	1161	1162	1163	1164	1165	1166	1167	1168	1169	1170	1171	1172	1173	1174	1175	1176	1177	1178	1179	1180	1181	1182	1183	1184	1185	1186	1187	1188	1189	1190	1191	1192	1193	
1194	1195	1196	1197	1198	1199	1200																													

PC 9/29-6

1. Do you work in a DP/MIS department? 01. ☐ Yes 02. ☐ No	16. ☐ Agriculture/Construction/Mining/ Oil/Transportation/Utilities	4. Is your company a reseller? 01. ☐ Yes 02. ☐ No	8. Do you plan to buy any PC Products? 01. ☐ Now 02. ☐ In 4 to 6 months 03. ☐ In 7 to 12 months 04. ☐ No definite plans	9. Number of Employees in your entire company: 01. ☐ 25 or less 02. ☐ 26-99 03. ☐ 100-499 04. ☐ 500-999 05. ☐ 1000 or more
2. Please indicate your company or organization's primary business activity: (Check one only.)	17. ☐ Non-Computer Retailer/Distributor	5. For how many IBM PCs and compatibles do you specify brands of products: 01. ☐ 10 or less 03. ☐ 26-99 02. ☐ 11-25 04. ☐ 100 or more	PLEASE PRINT CLEARLY	
01. ☐ Manufacturer of Computer Equipment, Computers, Software	18. ☐ Other Business or Service	6. Are there any PCs in your office? (Check all that apply.)	Name _____	
02. ☐ Manufacturer—Aerospace	99. ☐ Other	01. ☐ Linked to mainframe	Title _____ Telephone _____	
03. ☐ Manufacturer—Other		02. ☐ Linked to mini	Company Name _____	
04. ☐ Systems House		03. ☐ Networked together	Address _____	
05. ☐ Computer Consultant			City _____ State _____ Zip _____	
06. ☐ Computer Retailer/VAR/VAD Distributor				
07. ☐ Communications				
08. ☐ Finance/Banking/Insurance/ Real Estate/Accounting				
09. ☐ Education				
10. ☐ Government—Federal				
11. ☐ Government—Non-Federal				
12. ☐ Research and Development				
13. ☐ Data Processing/Computer Service				
14. ☐ Health/Medical/Legal Service				
15. ☐ Engineering/Architecture				

☐ Please send me one year (22 issues) of PC Magazine for \$29.97. Offer valid in U.S. only.

PC Magazine's BusinessCard section is a forum for innovative, hard-to-find and low-cost PC products and services. Ads are listed by product category and include Reader Service numbers to allow fast, easy response.

RATES:

1 issue—\$715, 3 issues—\$625, 6 issues—\$605,
12 issues—\$570, 17 issues—\$515, 22 issues—\$535.
Multiple-ad per issue rates also available.
Prepayment must accompany each insertion.
VISA/MC welcomed.

AD FORMAT:

PC Magazine will design and typeset each BusinessCard ad. Advertisers should furnish type-written copy. Ads include: 1) Headline (1 line, initial caps=30 characters max, all caps=25 characters max), 2) Descriptive copy (5 lines, 225 characters max), 3) Company name (same specifications as headline), and 4) Address and telephone number (2 lines, 40 characters per line). No logos, artwork or camera-ready ads. Publisher reserves the right to edit supplied copy to meet section specifications.

DEADLINES:

PC Magazine is published 22 times a year, (bimonthly except for July and August). The BusinessCard closing is approximately two months prior to issue date.
Please send copy and payment to:
PC Magazine BusinessCard
One Park Avenue, 3rd Floor
New York, NY 10016
For more information, call 800-825-4237 or 212-503-5175, FAX: 212-503-5860.

HARDWARE ADD-IN-BOARDS

LEARN PARALLEL PROCESSING

- Transputer Education Kit
- PC add-in board with transputer & 1MB mem
- T400 C & Occam2 compilers & debuggers
- 1500 pages of documentation with schematics
- Only \$396 Visa-MC-A/X accepted

Computer System Architects

15 North 100 East, #100, Provo, UT 84606-3100
(801) 374-2300 • (800) 753-4CSA

CIRCLE 801 ON READER SERVICE CARD

CD-ROM

"SO MUCH SHAREWARE / 2"

FANTASTIC NEW RELEASE, best CD-ROM at any price! 550 Megs, New menu, 50% '92 programs, Windows, utilities, Soundblaster, hot VGA arcade games and much more for only \$69.95. So much STAREware \$99 So much SCREENware \$69

POWER USER SOFTWARE

P.O. BOX 89 Ene, PA 16512
Orders: 800-424-0234 Fax: 814-864-3993

CIRCLE 802 ON READER SERVICE CARD

NIGHT OWL'S Shareware CDs

PC Mag Special Each 650mg 10,000 files, zipped w/retrieval. Also set-up for PCBoard. Few dupes between versions. v4.2 US\$69 C\$80, v5 or v6.1 or v7 • US\$69 C\$80, delivered, Canada+GST/OPST Check/Visa. Dealer inq. welcome. *late 9/92

Integrated Data Systems

120 27th St #3, Etobicoke, ON CDA M8W 2X7
(416) 252-1132 (voice eve.) 885 416-252-1133

CIRCLE 803 ON READER SERVICE CARD

WALNUT CREEK CDROM

Simtel20: 6000+MS-DOS programs. \$24.95
CICA: all sorts of MS Windows stuff \$24.95
Source: 600+megs. C, pascal, etc. \$39.95
Desktop Library: disc full of books \$39.95
MC/Visa. Money back guarantee (510) 947-5996

WALNUT CREEK CDROM

1547 Palos Verdes, Walnut Creek CA 94596
1 (800) 786-9907 Fax: 1 (510) 947-1644

CIRCLE 804 ON READER SERVICE CARD

ADULT AND SHAREWARE DISCS

Seedy Rom Six Pack, 4 gigs adult CD-ROMS \$199
Seventh Heaven Photodex adult 660 megs \$ 59
Night Owls' Shareware series from \$29 to \$69
Call for details about Photodex/others.
You must be 21 to order adult material. V/MC

TMC ENTERPRISES

1920 Ellesmere Road, Ste. 104-358
Scarborough, ONT M1H 3G1 (416) 724-8541

CIRCLE 805 ON READER SERVICE CARD

COMMUNICATIONS/NETWORKING

POOR MAN'S NETWORK!!!

Each unit connects 1 PC to 4 keyboards/monitors OR connects 1 keyboard/monitor to 4 PC's! Great for testing monitors OR allow up to 4 people to use 1 PC! Cascade 16 units for 64 users!
XT/AT/PS2/VGA/MONO versions. \$229

A & M Widget Company

Daly City, California
415-878-3569

CIRCLE 806 ON READER SERVICE CARD

KEYBOARD, VIDEO, MOUSE

EXTENSION with EXTENDER
SPLITTING with COMPANION
SWITCHING with COMMANDER
Boosts SIGNALS UP to 600 FT. Control Up to 96PC's with one KEYBOARD and MONITOR.

CYBEX CORPORATION

2800H Bob Wallace Ave., Huntsville, AL 35805
PHONE 205-534-0011 FAX 205-534-0010

CIRCLE 807 ON READER SERVICE CARD

VOICE/FAX MAIL HEADQUARTERS

- AFFORDABLE • FULL FEATURED • MENU DRIVEN
- VOICEMAIL 2 LINE \$995 4 LINE \$1495
- VOICE/FAXMAIL 2 LINE \$1495 4 LINE \$1995
- TELEMKTG. • DATELINE • TALKING CLASSIFIEDS
- CUSTOM SOFTWARE APPLICATION SPECIALISTS

K.C.I. CANADA

34 Robbie Ave. No York, Ontario M3H1Y4 Canada
Voice: (416) 633-0351 Fax: (416) 638-8512

CIRCLE 808 ON READER SERVICE CARD

COMPUTER SYSTEMS

386/486 WHOLESALE BLOWOUT

386-33 64K: \$1199 486-33 64K: \$1499
486-50DX2: \$1749 486-50DX: \$1899
4MB RAM, 1.2 & 1.44FD, 120MBHD, SVGA .28,
SVGA w/1M KB101, 251P1G, Mouse 1 Yr. Wnty
V/MC/AE Components & Printers avail • Best prices

ONE STEP AHEAD SYSTEMS

P.O. Box 832482 Richardson, TX 75080
(800) 886-0808 FAX (214) 234-3478

CIRCLE 809 ON READER SERVICE CARD

LOWEST PRICES IN THE USA!

386-33: \$1275 386-40: \$1290 486-20 \$1355
486-33: \$1595 486-50: \$1825 OPEN 7 DAYS!!!
Inc: SVGA.28, 105mHD, 4mRAM, 3.5&5.25, 2s1p1g
DOS5.0, Win 3.1, Mouse. Call for Others.
1 Year Wnty, 30 Day \$ Back, Since 1986

Xtra Mile Computer Company

7933 Silverton #701, San Diego, CA 92126
(800) 398-9680 (619) 536-2700 Fax: 536-2704

CIRCLE 810 ON READER SERVICE CARD

PERIPHERALS

??? RADIOACTIVE ???

Plot it on PC with RM-60 Rad. Monitor+Alarm. Serial or LPT port. Alpha-Beta-Gamma-Xray. RADON + Sources+WINDOWS+MicroR:1000X survey geigers Background+Food+Clouds. TSR, GM tube. PC Mag & Byte rev. V/MC \$149.50 \$45 day \$back.

AWARE ELECTRONICS CORP.

P.O. Box 4299, Wilmington, DE 19807
(800) 729-5397 Phone or Fax: (302) 655-3800

CIRCLE 811 ON READER SERVICE CARD

SOFTWARE BUSINESS

THE PERSONNEL MANAGER

A favorite of Businesses Worldwide. A single or networked, Menu driven Management Information System for Small or Large Businesses. Provides Employee information, Job matching, Management Reports. Pays for itself.

LAUREL HILL SOFTWARE CO.

Box 98 Main St., Laurel Hill, FL 32567
Call 1-800-554-2676 for more information.

CIRCLE 812 ON READER SERVICE CARD

THE INFORMATION MANAGER

OMNI+ integrates people control, event scheduling and tracking, management by objectives, contact history, budgeting, expenditures and receipts, notes and more in a professional, easy-to-use package.

MIND OVER MATTER SYSTEMS

608 Crest Drive, Birmingham, AL 35209
(205) 871-7339

CIRCLE 813 ON READER SERVICE CARD

BlankCheck™

Print checks on your HP laser printer. Handles 300 checking accounts. Reads ASCII text file created by your accounting system and prints entire check in one pass. Complete kit including software, MICR toner and forms only \$799.

SouthData, Inc.

PO Box 1703, Mt. Airy, NC 27030 800-628-7227
In Canada: Capriole Software 416/288-1266

CIRCLE 814 ON READER SERVICE CARD

Invoicing / Orders Mgmt Solution

MICRO-PROFIT-G emphasizes easy, flexible orders mgmt. Purch/sales orders, invoices, statements, checks. Tracks open orders, sales, cust. history, commissions, rebates, sales taxes and much more. Inc. AR and AP. Only \$239.

Micro Assistance, Inc.

P.O. Box 157 Liberty Lake, WA 99019-0157
509-255-9220 FAX 509-255-9455

CIRCLE 815 ON READER SERVICE CARD

BUSINESS

STOP! Don't Read This Ad....

...unless you are starting or expanding a business. To increase your chances of success, you need a winning business plan. Business Architect can build it! Money back guarantee.

Enterprising Solutions, Inc.

P.O. Box 31, Cottleville, MO 63338
1-800-831-6610

CIRCLE 816 ON READER SERVICE CARD

CAD/CAM

AutoCAD Users: Get Productive!

With AutoMate/PRO™ software. • Icon menus • movable, resizable bird's eye view • real-time anti-aliasing • magnifying glass • real-time pan & zoom • Quick Menu & more, supports VGA & TIGA at any resolution. \$295-\$back guarantee.

Vermont Microsystems, Inc.

Call to order at
1-800-354-0055 or 1-802-655-2860

CIRCLE 817 ON READER SERVICE CARD

COMMUNICATIONS/NETWORKING

PC VOICE MAIL KIT \$1795

• Voice Processing on your PC • Software and 4 line board included • Order Taking • AUDIOTEX • Voice Messaging • Never miss another call! • HUNDREDS OF USES • Don't pay \$1,000's CALL TODAY FOR Free DETAILS • 2yr warranty

Amerifax Services Corp.

572 W. Market St. #5, Akron, OH 44303
(216) 253-8787 • (216) 762-6050 Demo

CIRCLE 818 ON READER SERVICE CARD

FileWizard

Analyze NetWare server by user, volume, directory, and file extension, over time. Create action/archive strategies to fit your specific needs. Users retrieve archived files. Full range of Graphical analysis, printed reports & forecasting.

Knozall Systems, Inc.

375 E. Elliot Rd., Ste 10, Chandler, AZ 85225
800-333-8698 602-545-0006/Fax 545-0008

CIRCLE 819 ON READER SERVICE CARD

IND\$FILE•3164•VT100 for PC/Macs

File transfer, terminal emulation, remote takeover, script encryption • Trace facility • Editor • Customizable Colors • User-definable keyboards • Scripting • Full-featured demos. RCOM/MF for TSO, CICS, CMS, ICCF, DOS/BAT.

COMPUTER VECTORS, Inc.

74-5599 Luhia St., #E-7, Kailua-Kona, HI
800-262-RCOM 808-329-6646

CIRCLE 820 ON READER SERVICE CARD

COMPUTER LANGUAGES

FORTAN LANGUAGE SYSTEMS

32-bit and other PC Fortran compilers to meet your programming needs. Editor's Choice & Tech Excellence Winners. • Call 800-548-4778 •

LAHEY COMPUTER SYSTEMS

BOX 6091 Incline Village, NV 89450
Tel: 702-831-2500 Fax: 702-831-8123

CONSTRUCTION

SERVICE MANAGEMENT SOFTWARE

Instant access to customer history. Automated dispatching. Timely billing. Take charge of your business with CMAS Plus, our integrated accounting/job costing/service management system for specialty contractors. Call for free demo.

DATA-BASICS, INC.

11000 Cedar Road•Cleveland, OH 44106
1-800-837-7574•Fax (216) 721-2398

CIRCLE 822 ON READER SERVICE CARD

THE COMPLETE BIDDING SOFTWARE

ISSPro offers:

- Estimation, Take-Off, User/Mean Data Banks
- UNIQUE Bid-Closing Management System
- Automatic Faxing & sub-trade Invitation.
- From \$2300. Dealers Welcome ••

ISS SOFTWARE, INC.

207-550 Alden Rd., Markham, Ont. L3R 6A8
Tel: (416) 946-1880, Fax: (416) 946-1883

CIRCLE 823 ON READER SERVICE CARD

DATA BASE

SAVE 99% IN DEVELOPMENT TIME

For dBase, FoxBase, & Clipper applications with multiple databases/relations, unlimited queries & fixed/custom reports. Modifications done easily. NO PROGRAMMING REQUIRED. dBREADY™. For limited time only \$79. Actual price \$379.

Absolute Computer Services, Inc.

5033 Lincoln Oaks, S.#1203, Ft.Worth, TX 76132
817-370-8385

CIRCLE 824 ON READER SERVICE CARD

End Database Mailing Hassles!

Easy, menu-driven s/w places main/return addresses, even custom message where you want on envelopes to 11X17; sngl, dbl, no windows; works w/all major printers & databases. \$30 + \$5 ship. More info under Mailing Programs.

EZ ENVELOPE

137 E. Fremont Ave., Suite 5235
Sunnyvale, CA 94087-3201 FAX: 408-247-0167

CIRCLE 825 ON READER SERVICE CARD

dBASE file access from C, Basic,....

CodeBase 4.5 gives multi-user database management capabilities and dBASE, FoxPro or Clipper file compatibility from C, C++, Visual Basic or Pascal for Windows. Full 90 day money back guarantee. Call now for a FREE DEMO.

SEQUIER SOFTWARE

#209, 9644-54 Ave, Edmonton, AB, Can. T6E 5V1
Call (403) 437-2410, Fax (403) 436-2999

CIRCLE 826 ON READER SERVICE CARD

ENTERTAINMENT/GAMES

PRO FOOTBALL EDGE! 1992

- Professional, menu driven software tool.
- Handicaps NFL Game Winners and Over/Unders.
- Includes 10 year database & 92 schedule.
- Send \$39.95 or \$2 for DEMO. Plus \$3 S&H.
- Specify 5" 3" disk. 1st/Last Ad so act now!

G & S SOFTWARE

P.O. Box 28391, Tempe, AZ 85285-8391
Orders 1-800-279-5914 (602) 438-2062

CIRCLE 827 ON READER SERVICE CARD

Go, NEMESIS, Go!

Go-a Zen game. So appealing, it has endured 4,000 years. So useful, governments study it. NEMESIS Go Junior entices novices of any age. NEMESIS Go Master Deluxe satiates the addicted. Chaos Manor Users Choice Award (Byte - 1990)

TOYOGO, Inc.

PO Box 25460-M, Honolulu, HI 96825-0460
(800)869-6469 (808)396-5526 fax: 396-4126

CIRCLE 828 ON READER SERVICE CARD

FOREIGN LANGUAGES

TRANSLATION SOFTWARE

Economical translations of foreign languages. Correct Grammatical structure. Updatable dictionaries. Produce clear, understandable text on PC. Sentence by sentence translation of French-German-Spanish-Russian. Circle card for info & demo disk.

Globalink Marketing Inc.

6034 W. Courtyard Dr., Austin, TX 78746
1-800-324-2150 FAX 512-338-2151

CIRCLE 829 ON READER SERVICE CARD

GENERAL

USED SOFTWARE FOR SALE

We buy and sell used current versions of popular IBM compatible software for business and home. Save money by buying used software with original diskettes and manuals, guaranteed virus free. Call 8 am - 5 pm EST for complete price list.

RECYCLED SOFTWARE

P.O. Box 266, Kings Mills, OH 45034
1-800-851-2425

CIRCLE 830 ON READER SERVICE CARD

LATEST SOFTWARE AT LOW PRICES

- More than 2000 titles for IBM-PC
- For a free catalogue write to:

ROHET ATALLAH

P.O. BOX 3693, DAMMAM 31481
SAUDI ARABIA

CIRCLE 831 ON READER SERVICE CARD

GRAPHICS

ALL PC SLIDES JUST \$5

35mm slides from the most popular IBM packages. We process at 4K resolution. Free return shipping. Design services also available. Call or write for free brochure.

VALUE GRAPHICS

28382 S. Western #436, RPY, CA 90732
Phone & Fax (310) 519-9227

CIRCLE 832 ON READER SERVICE CARD

PCX CLIPART COLLECTIONS

Clipart of Cowboys \$29.95, Clipart of Indians \$29.95, Clipart Ancient Rome \$29.95, Clipart Ancient Greece \$29.95. Over 100 copyright free images each, Specify HD 3.5 or 5.2, Add \$4.95 S&H, TX res add 8.5% tax, 6 wks del, Send CK/MO:

Clipart of the Wild West

P.O. Box 5867, Katy, TX 77450
713/392-1315

CIRCLE 833 ON READER SERVICE CARD

GRAPHICS

INGRAF - Graphics Library

Multi-Device Graphics Library. Some of the devices supported are: SVGA, Epson, LaserJet, PaintJet, Postscript, HPGL, DM/PL. Available in C, FORTRAN, PASCAL and BASIC languages. Full source code and Library. NO ROYALTIES. \$350.00

Sutrasoft

10506 Permian Dr. • Sugar Land, TX 77478
TEL: (713) 491-2088 • FAX: (713) 240-6883

CIRCLE 634 ON READER SERVICE CARD

HEALTH

Nutrition & Fitness Software

The TOP-Rated Software. Lose weight! Plan workouts! Control fat, cholesterol, salt! Plan/analyze menus! GET RESULTS! Personal & professional software. 50+ functions, terrific reports, 2000-11,500 foods. From \$29 - \$995. FREE Demo Disk.

ESHA Research

POB 13028M, Salem, OR 97309-1028
503-585-6242 fax: 503-585-5543

CIRCLE 635 ON READER SERVICE CARD

NUTRITION SOFTWARE - \$11

Everything you need. 750,000 prgms sold! Analyzes foods, workouts, fat, cholesterol, etc. Creates menus. Provides guidelines. Complete 3-disk/3-prgm set. Send \$11 & specify disk size & IBM or Mac. SATISFACTION GUARANTEED.

Ohio Distinctive Software

4588 Kenny Road, Columbus, OH 43220
614-459-0453

CIRCLE 636 ON READER SERVICE CARD

Nutrition/Medical Diagnosis

The Leader in Nutrition & Exercise Software! Analyzes Recipes, Diets; Auto-Creates Menus. Allergy, Drug, & Differential Diagnosis. Veterinary Diagnosis & Animal Nutrition. Over 100,000 sold. IBM & MAC. Call for free demo.

N-Squared Computing

3040 Commercial Street SE, Suite 240
Salem, OR 97302 (503) 364-9118

CIRCLE 637 ON READER SERVICE CARD

INVENTORY

INVENTORY MANAGEMENT

StockMaster 4.0, com. grade system, has Stock Status Rptg, PO Write & Track, Trend Analysis, QC Rptg, Trans Hist Detail Analysis, Multi Loc support, BOM, Matl Req Planning, Serial/Lot No Track, Quote/Ord/Inv Prep.

Applied Micro Business Systems, Inc.

177F Riverside Ave., Newport Beach, CA 92663
714-759-0582

CIRCLE 638 ON READER SERVICE CARD

INVENTORY PROBLEMS SOLVED!

Track Expendable Inventory (Internal Stockroom), Fixed Assets, Bids, and Purchase Orders. Bar code option. Eliminate waste, over/under stock, etc. Auto reorder, tracks usage by dept., item, and GL No. Prints 360 error-free PO's per hour! Demo disk.

Certified Management Software, Inc.

142 East 200 South SLC, UT 84111
TEL (801) 534-1231 FAX (801) 363-3653

CIRCLE 639 ON READER SERVICE CARD

dfELLER Inventory

Business inventory programs written in modifiable dBASE source code. dfELLER Inventory \$150, dfELLER PLUS \$200 with History and Purchase Orders (Good for Stockrooms) Requires dBASE III PLUS, or dBASE IV.

Feller Associates

550 CR PPA, Route 3 Ishpeming, MI 49849
306-486-6024

CIRCLE 640 ON READER SERVICE CARD

MAILING PROGRAMS

EZ Envelope for Easy Mailings

Quickly, easily format & address envelopes from your database list. Simple menus; keyboard or mouse; DOS, OS/2, Windows; PC or network; font control; 3.5" or 5.25" disk; \$30 + \$5 ship. More info under Data Base.

EZ ENVELOPE

137 E. Fremont Ave., Suite 5235
Sunnyvale, CA 94087-3201 Fax: 408-247-0167

CIRCLE 641 ON READER SERVICE CARD

MAINTENANCE/PREVENTIVE MAINTENANCE

REDUCE Maint/Energy/Utility Costs!

Does EVERYTHING! Just the way you want it! Prev/Pred Maint, Energy/Utilities Tracking & Conservation, Rate Analysis! All in same DB. Written in "C". In business since 1975. QUALIFIED REPS NEEDED IN SOME AREAS

GENERAL ENERGY TECHNOLOGIES

250 E. 17th St., Costa Mesa, CA 92627
714-645-7733 Fax: 714-645-7747

CIRCLE 642 ON READER SERVICE CARD

MAINTENANCE MANAGEMENT

PC-based system for the small to medium size business. FEATURES: Work Orders (space for detail instructions & safe work procedures), equipment descriptions, historical data, operating & analytical reports, inventory. Free Demo !!

PENGUIN COMPUTER CONSULTANTS

P.O. Box 20485, San Jose, CA 95160
(408) 997-7703 FAX: (408) 927-0570

CIRCLE 643 ON READER SERVICE CARD

MEDICAL

PRACTICE BILLING

MD VersaForm, flexible, ledger based design, billing package. Programmable; customizable reports, files, & screens; includes database mgmt system & full source. ECS. LAN support. \$1,295 sgl user. Free lit & demo. Dirs wanted.

Applied Software Technology

591 W. Hamilton Ave., Ste 201, Dept. 99
Campbell, CA 95008 (800) 678-1111 Ext. 99

CIRCLE 644 ON READER SERVICE CARD

MediSoft Advanced v3.5 \$475

Full featured Practice Mgt. Software • Patient Data, Ins. aging, line item pymt, reports & more! • New HCFA-1500, Elect. billg., Calc. Appt. bk., dialer. • Call for special pricing on our Computer Systems. • Tel. training & support/Auth. Preferred Dealer.

American Medical Computers

197 Durham Ave, Metuchen, NJ 08840
T (908) 549-3935 F (908) 549-6098

CIRCLE 645 ON READER SERVICE CARD

PROGRAMMERS TOOLS

BASIC PROGRAMMING TOOLS

Crescent offers many tools for QuickBASIC, PDS, and Visual Basic, all with tutorials and full source. Assembly routines, graphics, screen design w/data entry, BASIC TSR's, and much more. No royalties. Call or write for our catalog.

CRESCENT SOFTWARE, INC.

11 Bailey Avenue, Ridgefield, CT 06877
Orders: 800-35-BASIC, Tech: 203-438-5300

Translate dBASE programs to C

CodeTranslator converts dBASE programs into working C applications. This turbo charges slow dBASE applications, helps you port to Unix, MS Windows, or OS/2, and helps dBASE programmers learn C easily. Call now for more info.

SEQUIER SOFTWARE

#209, 9644-54 Ave, Edmonton, AB, Can. T6E 5V1
Call (403) 437-2410 Fax (403) 436-2999

CIRCLE 647 ON READER SERVICE CARD

Powerful Turbo Pascal Tools

Libraries from TurboPower help you develop Turbo Pascal applications easier and faster. Experts say "An Essential Toolkit", "Outstanding". OOP and non OOP libraries, BTree, Async and more. Call or write for a FREE brochure.

TurboPower Software

P.O. 49009 Colorado Springs, CO 80949-9009
(800) 333-4160, FAX (719) 260-7151

PUBLIC DOMAIN/SHAREWARE

Software for the SKINFLINT!

for less than 20c per day (\$6 per month ppd.) receive 5 5 1/4" (3 3 1/2") disks packed with DOS or Windows software (your choice) each month. No Annual Fee • Start and Stop Any Time! Your ABSOLUTE SATISFACTION is Guaranteed

MidWest Information Systems

2400 E. Main #103-293, St. Charles, IL 60174
800-859-5080 (24 hrs) • Visa/MC

CIRCLE 649 ON READER SERVICE CARD

Join The Shareware Revolution!

Quality software for your PC or Compatible at Low, Low prices! We have 100's of exciting new programs and applications. Association of Shareware Professionals approved vendor. Send \$1.00 for large descriptive catalog.

SOUTHERN DATA

P.O. BOX 8926, PEMBROKE PINES, FL.
33084-8926

CIRCLE 650 ON READER SERVICE CARD

REAL ESTATE

Property Management

With Rental-Ease save \$3 on your investment! Guaranteed to be the easiest & fastest property management system available at any price. Versions for owners, professionals, networks. \$395 to \$1295. Demo \$10. Dealers welcome!

Strategic Office Systems

688 N. 500 W. #61, Mt. Pleasant, UT 84647
(800) 942-6784 or (801) 462-2130

CIRCLE 651 ON READER SERVICE CARD

REAL ESTATE

PROPERTY MANAGEMENT

Since 1978 over 7,500 users of our software have found it comprehensive, flexible & easy to use. We offer systems to manage: Commercial/Residential/Condominium/Homeowners/Assoc./Mini-Storage Facilities. For info. & prices call:

REALTY AUTOMATION

11365 East Shore Drive, Hayden Lake, ID 83835
(208) 772-3259

SOFTWARE SEARCH SERVICES

Can't Find The Right Software?

Call Us! Soft-Where?, Inc., an application software search service, will help you qualify and locate applications. We cover all the fields: business, technical, manuf., medical, and other services. From \$15.95 per abstract (VISA, MC, AMEX)

SOFT-WHERE?, INC.

1-800-666-7724 (FAX) 801-261-1068

CIRCLE 858 ON READER SERVICE CARD

#1 in Surveys - StatPac Gold IV

Professional's choice for survey & marketing research. User-friendly, comprehensive & dependable. Camera ready tables & graphics. Basic & advanced statistics. CRT & telephone interviewing. Easiest to learn. Guaranteed.

StatPac Inc.

3814 Lyndale Ave. S., Mpls., MN 55409
Tel: (612) 822-8252 Fax: (612) 822-1708

CIRCLE 884 ON READER SERVICE CARD

STATISTICS

Property Management

Software for managing residential, commercial, condos, etc. Basic version for owner/manager- \$495, Deluxe for professional managers- \$1,195, Network-\$2,395. Includes check writing, recurring expenses, G/L, management reporting.

YARDI SYSTEMS, INC.

819 Reddick Street, Santa Barbara, CA 93103
(805) 966-3666

CIRCLE 853 ON READER SERVICE CARD

NCSS 5.x Series - \$125

"Best value & easiest to learn/use" PC-Week. Menus/Spreadsheet. Means, etc. Regression, t-tests, ANOVA. Factor, cluster & discriminant. Cross tabs. Nonparametrics. Histograms. Plots. Reads ASCII/Lotus. Many extra modules.

NCSS

329 North 1000 East, Kaysville, UT 84037
Phone: 801-546-0445 FAX: 801-546-3907

CIRCLE 859 ON READER SERVICE CARD

UTILITIES

PEN PLOTTER EMULATOR

FPLLOT turns your printer into an HP pen plotter. Fast hi-res, no jagged lines. Vary line width, color. Screen preview - zoom, pan. Works with most CAD programs. Supports most printers. Requires DOS 2.1 or higher. \$119+\$3 S&H. VISA/MC/Chk/MO.

FPLLOT Corporation

24-16 Steinway St., Suite 605
Astoria, NY 11103 • 718-545-3505

CIRCLE 885 ON READER SERVICE CARD

The Landlord® & The Landmaster®

Property management software purchased by more than 5,000 owners and property managers since 1980. Handles residential and commercial tenant accounting; prints checks and statements. G/L and A/P included. From \$595 to \$2200.

The Landlord Software Center

427 East Patrick Street, Dept. E
Frederick, MD 21701 (301) 695-1544

CIRCLE 854 ON READER SERVICE CARD

WinSTAT™ Statistics for Windows

All the statistical methods you need, with all the convenience of Windows! Up to 65,000 variables & cases. Import/export Lotus, dBASE, etc. files. Cut & paste tables/graphs to word processor. Call for brochure and/or \$10 demo. V/MC/PO/COD.

Kalmia Co. Inc.

71 Dudley St., Dept. 29, Cambridge, MA 02140
Phone/FAX: (617) 864-5567

CIRCLE 860 ON READER SERVICE CARD

REMOVE HARDWARE LOCKS

Protect your investment! Maintain Productivity! Software utility that allows for the removal of hardware locks. Available for most CAD/CAM & PCB sw programs. Easy - Simple - Guaranteed Programs start at \$99.00 Call or Fax for info.

SafeSoft Systems Inc.

202-1100 Concordia Ave., WPG, Mb, CANADA
R2K 4B8 (204)669-4639 Fax(204)668-3566

CIRCLE 886 ON READER SERVICE CARD

RELIGION

Bible Study Software

For 10 years we have remained the leading Bible study software company. Think of us as a Bible bookstore with an integrated family of software products for your Bible study needs! Call for a FREE catalog!

Bible Research Systems

2013 Wells Branch Pkwy. #304 Austin, TX 78728
1-800-423-1228 1-512-251-7541

VISUALIZE YOUR DATA

MCA+ transforms most marketing and social science data to easily understood perceptual maps. Communicate complex relations with ease using presentation quality charts. Most printers supported. Demos available

Bretton-Clark

89 Headquarters Plaza, Morristown, NJ 07960
(201) 993-3135 FAX: (201) 993-1757

CIRCLE 861 ON READER SERVICE CARD

All New "PC PAGER"™

Now your PC can PAGE you with an audible alarm/phone or pocket pager when your:

- spreadsheet/database is done processing.
- tape backup is ready for the next tape, etc.

Only \$29.95. Money back guarantee.

ADVANTAGE SOFTWARE

3713 Garrett Road, Drexel Hill, PA 19026
215-626-5914 (Voice/Fax)

CIRCLE 867 ON READER SERVICE CARD

SALES MARKETING

SALES ALLY Software

•PC Magazine Editors' Choice • PC Computing "Best Product" • Mobile Office Mag Annual Award Client & Prospect Management Database, Word-processor, & Notepad Autodialing, Reports, Alarms Invoicing, Sales Forecasting, Networks. \$395

SCHERRER RESOURCES, INC.

8100 Cherokee Street Philadelphia, PA 19118
215-836-1830 (Visa/MC/Amex)

CIRCLE 856 ON READER SERVICE CARD

PsychStat MAX 2.1 - \$59.95

Frequency • descriptives • chi-square • ttests, ONEWAY • ANOVA • ANCOVA • multiple regression • repeated measures • correlation • transformations • right-wrong and Likert item analysis • Cronbach's alpha • point-biserials • much more.

PsychStat

1003 Justin Ln 2118, Austin, TX 78757
512-451-8152

CIRCLE 862 ON READER SERVICE CARD

WINDOWS

Pinpoint PC Bottlenecks

- Personal Measure shows how apps spend time.
- Upgrade or replace PCs based on hard facts.
- Identify network trouble spots.
- Resolve app problems using our services.
- \$125 + S&H (5.25" or 3.5") MC/VISA

SPIRIT OF PERFORMANCE, INC.

73 Westcott Road, Harvard, MA 01451
tel. 508/456-3889, telex 6503571400

CIRCLE 868 ON READER SERVICE CARD

SCIENTIFIC

OVER 300 SCIENTIFIC PROGRAMS!

The largest selection of affordable scientific software available. FREE CATALOG!
Geology • Statistics • Biology • Hydrology • Archeology • Civil Engineering • Chemistry • Environmental Engineering • Geophysics...

ROCKWARE, Inc.

4251 Kipling St., Suite 595, Wheat Ridge, CO 80033 (303) 423-5645 Fax (303) 423-6171

SURVEYS

The Survey System

Analyzes market research, public opinion, customer satisfaction and employee attitude surveys. Easy to learn and use. Produces presentation quality tables and graphics. Statistics, verbatim, Interviewing and network options.

Creative Research Systems

15 Lone Oak Ctr. - Dept. P, Petaluma, CA 94952
Ph.(707)765-1001 Fax (707)765-1068

MISC./BUSINESS OPPORTUNITIES

YOUR COMPUTER+OUR PRINTER=\$\$

Instantly print 4 color text/graphics on caps, mugs, shirts, plaques, metal, umbrellas, ties, etc. Print one or many! Standard interface, easy "up & running". Info Package, samples, video! Call:

SEUS Company

3500 Lakeview Road, Hattiesburg, MS 39033
800-343-6671

CIRCLE 869 ON READER SERVICE CARD

BUSINESS OPPORTUNITIES

COMPUTERS & INFO EARN MONEY

Turn your expertise into a Home Based Business in the informational field with our Micro Moonlighter Newsletter & our 7 hour video which gives you ideas & methods on how your knowledge can make you an information entrepreneur.

THE TECHNICAL GROUP, INC.

Ste. B-1, Industrial Dr., Springfield, IL 62703
1-800-635-9675 (217) 585-3456

CIRCLE 870 ON READER SERVICE CARD

DISKETTE COPY SERVICES

DUPLICATE DISKS FAST!

DiskDupe copies 2 to 6 times faster than DOS! Reads master once, makes unlimited copies. Stores images on hard disk. Pull-down menus. Automatically formats. 5", 3", high-density. Only \$79, Money Back Guarantee!

MICRO SYSTEM DESIGNS, INC.

10062 Miller Ave. #104, Cupertino, CA 95014
408-446-2066 Fax: 408-446-2095

CIRCLE 871 ON READER SERVICE CARD

INSURANCE

Insurance For Business Computers

Covers desktops, laptops, networks, all software, and even valuable data files. Don't settle for policies designed for home computers or office typewriters if you use your system for business. Low premiums. Call 24 hrs. to receive application.

DATA SECURITY INSURANCE

4800 Riverbend Road, Boulder, CO 80301
1-800-822-0901

ON-LINE SERVICES

THE BEST BBS IN THE UNIVERSE

Modem access to 45000(+) IBM compatible programs. Global INTERNET E-mail! FREE files for new users. Hundreds of new programs each week. X Rated too. 46 Phone lines with Hayes, USR & CompuCom modems. No hourly fees - Amex/MC/Visa.

THE INVENTION FACTORY INC.

1200/2400 Baud (212) 274-8110 @ N-8-1
9600/14.4 Baud (212) 274-8298 @ N-8-1

CIRCLE 873 ON READER SERVICE CARD

TALK DIRTY ON THE LIFESTYLE BBS

WHERE EROTIC COUPLES & SINGLES MEET
SWINGING/B&D/BI/TV/FETISHES
THE HOTTEST CHAT BBS IN THE U.S.
1,000+ CALLS/DAY - 1,500+ ACTIVE MEMBERS
LESS THAN 30 CENTS PER HOUR

LIFESTYLE BBS

PO BOX 453 Lake Grove, NY 11755-0453
Log on with modem 516/689-5390

CIRCLE 874 ON READER SERVICE CARD

SERVICES

FOR HIRE - TYPIST - 1,200 WPM

- Why type when we can SCAN it?
- Fast, Accurate, Inexpensive. Overnight Svc Avail
- Any text-docs, financials, lists, manuscripts, etc.
- Converted to diskette file for any PC or Mac program—spreadsheet, word processor, database

ScanType

6557 Via Barona, Carlsbad, CA 92009
(800) 597-SCAN In CALIF: (800) 300-SCAN

CIRCLE 875 ON READER SERVICE CARD



PC MAGAZINE MARKETPLACE

One Park Avenue
Third Floor
New York, NY 10016
Att.: Monte Wasch

For further information
on advertising in
PREMIER, CLASSIFIED
or BUSINESSCARD,
contact your account
representative or call
212-503-5115 or
1-800-825-4237.

ADVERTISING ACCOUNT REPRESENTATIVES

Michael Alexander 212-503-5118
CA (408, 415, 510)

Bill Herbst 212-503-5193
CT, MA, NH, NJ, NY, OH, RI,
VT, PA

Margaret Kennelly 212-503-5176
AL, DE, DC, FL, GA, KY, MD, MS,
NC, SC, TN, VA, WV

Caroline Padron 212-503-5156
CA (209, 707, 916), CO, ID, MT,
NV, OR, UT, WA, WY

Claudia Porfilio 212-503-5184
CA (213, 310, 714, 818), HI

Jason Weiskopf 212-503-5145
AR, AZ, CA (619, 805), LA, NM,
OK, TX

Stuart Zura 212-503-5117
AK, CN, IL, IN, IO, KS, MI, MN,
MO, NB, ND, SD, WI, OVERSEAS

BusinessCard Account Representatives

Daniel Morton 212-503-5216
Tim Stanton 212-503-5175

NATIONAL ADVERTISING STAFF

Vice President,
Central Advertising
Paul Stafford

Central Advertising Director
Vickie L. Pinsky

Sales Manager
Monte Wasch

Sr. Advertising Coordinator
Wanda D. Brown

Advertising Coordinator
Krupal Prabhakar

Production Director
Anne Brockinton

Sr. Production Coordinator
Mary C. Murawinski

Production Coordinators
Berhan Asmarom
Nadine Messier



Advertising Sales Staff

One Park Avenue,
New York, NY 10016
212 503-5100

DISPLAY ADVERTISING

Dan Rosensweig -
Associate Publisher
(212) 503-5354

Anna Zornosa - Associate
Publisher/West Coast
(415) 378-5505

Robert Diftler - Central
Advertising Manager
(312) 346-7666

Lon Otremba -
East Coast
Advertising Director
(212) 503-4453

Sales Manager
Michael Hatherill
(212) 503-5128

Ad Systems Supervisor
Christine Holsten
(212) 503-5264

Advertising Coordinator
Jamie Todfield
(212) 503-5107

MA, NH, VT, ME, RI

District Sales Manager
Kimberly Rene White
10 President's Landing, Mystic
Central
Medford, MA 02155
(617) 393-3055

Account Representative
Ira Becker
(212) 503-5132

CT, NY, NJ, PA

District Sales Manager
Michael Bird
One Park Avenue, 4th Floor
New York, NY 10016
(212) 503-5307

District Sales Manager
Lisa Friedman
(212) 503-5149

Sr. Account Representative
Karen Keavey
(212) 503-5333

DE, MD, DC, VA, WV, NC, SC, AL,
MS, TN, AR, KY, GA, FL

3405 Piedmont Road, Suite 460
Atlanta, GA 30305
(404) 239-9780

Account Representative
Allyson Deane
(212) 503-5044

NE, WI, IL, IN, KS, MN, MO, OH,
MI, IA, ND, SD, Canada

District Sales Manager
Stephen Dress
150 North Wacker Drive, 25th Floor
Chicago, IL 60606
(312) 346-7666

District Sales Manager
Jay Overbye
(312) 346-7666

Sr. Account Representative
Beth Boyle
(212) 503-5047

Account Representative
Maureen Dooley
(212) 503-5126

TX, OK, LA, NM

District Sales Manager
Paul Klein
5956 Sherry Lane, Suite 625
Dallas, TX 75225
(214) 360-5725

Sr. Account Representative
Stephanie Brzozowski
(212) 503-5675

CA (San Diego & Orange County),
AZ, NV, HI

District Sales Manager
David Lynn (714) 852-5924
18500 Von Karman Avenue, Suite 510
Irvine, CA 92715
(714) 852-5914

District Sales Manager
Robin Kofsky
(714) 852-5920

Sr. Account Representative
Molly Shank
(212) 503-5113

For more information
regarding display
advertising please call:
212 503-5100
1-800-33MAG AD

CA (Los Angeles)

District Sales Manager
Mary Arlotto (213) 351-1811
3530 Wilshire Boulevard, Suite 645
Los Angeles, CA 90010
(213) 351-1810

Account Representative
Elizabeth O'Connor
(212) 503-5040

CA (San Jose)

District Sales Manager
Michael Klein (415) 378-5521
110 Marsh Drive, Suite 103
Foster City, CA 94404
(415) 378-5520

Sr. Account Representative
Kathy Kottenbach
(212) 503-5041

Mike Kisseberth - Northwest
Advertising Manager
(415) 378-5510

CA (San Francisco & North), ID,
OR, WA

District Sales Representative
Todd Anderman (415) 378-5527
110 Marsh Drive, Suite 103
Foster City, CA 94404
(415) 378-5520

District Sales Representative
Rick Vandervoorn
(415) 378-5523

Account Representative
Mike Medwig
(212) 503-5129

CA (South San Francisco to
Mountainview), CO, UT, WY, AK

110 Marsh Drive, Suite 103
Foster City, CA 94404
(415) 378-6859

Sr. Account Representative
Kathy Kottenbach
(212) 503-5041

Account Representative -
Networking
Andrew Jacobs
(212) 503-5130

Account Development Specialist
Ronni Reiburn
(212) 503-5104

CENTRAL ADVERTISING

VP, Central Advertising
Paul Stafford

Central Advertising Director
Vickie L. Pinsky

Sales Manager
Monte Wasch

Production Director
Anne Brockinton

Production Supervisor
Bessi Dion

Production Coordinator
Mary C. Murawinski

CA (408, 415, 510)

Account Representative
Michael Alexander
(212) 503-5118

CT, MA, NH, NJ, NY, OH, RI, VT, PA

Account Representative
Bill Herbst
(212) 503-5193

AL, DE, DC, FL, GA, KY, MD, MS, NC,
SC, TN, VA, WV

Account Representative
Margaret Kennelly
(212) 503-5176

CA (209, 707, 916) CO, ID, MT, NV, OR,
UT, WA, WY

Account Representative
Caroline Padron
(212) 503-5156

CA (213, 310, 714, 818), HI

Account Representative
Claudia Porfilio
(212) 503-5184

AR, AZ, CA (619, 805), LA, NM, OK, TX

Account Representative
Jason Weiskopf
(212) 503-5145

AK, CN, IL, IN, IO, KS, MI, MN, MO,
NB, ND, SD, WI, OVERSEAS

Account Representative
Stuart Zura
(212) 503-5117

Business Card Account
Representatives
Daniel Morton (212) 503-5216
Tim Stanton (212) 503-5175
PC Magazine Marketplace
3rd Floor, One Park Ave.
New York, NY 10016

For more information
regarding central
advertising please call:
212 503-5115
1-800-825-4237

Advertisers' Index COMPANIES

Reader Service No.	Advertiser	Page
293	3 Com.....	288-289
360	Acma Computers, Inc.....	18
096	AddStor.....	58
162	American Power Conversion.....	332
100	Approach Software.....	309
336	Arlington Computer Products.....	436
254	Artisoft.....	221
*	Asante Technologies.....	36
111	ASP Computer Products.....	88
337	ATI Technologies Inc.....	260-261
099	Aurum Computer.....	120
012	Austin Computers.....	13-15
351	Banner Blue.....	231
130	BASF Corp.....	330
287	Borland International.....	51
295	Borland International.....	53
285	Borland International.....	54-55
328	Buffalo Products.....	442
015	Bulldog Computer Products.....	468
292	Caere Corporation.....	78-79
190	CallSoft.....	80
187	Canon, USA.....	178
079	Central Point Software.....	43
026	Colorado Memory Systems, Inc.....	86
137	Compaq Computer Corporation..	180-183
128	CompuAdd Express.....	169-176
126	CompuAdd.....	369-378
205	Compuclassics.....	454
357	COMPU DYNE.....	235-237
132	COMPU DYNE.....	311-313
300	Computability.....	461
348	Computer Associates.....	2-3
400	Computer Associates.....	5
381	Computer Associates.....	292-293
109	Computer Discount Warehouse..	465-467
009	Computer Library.....	406
158	Computer Library.....	409
105	Computer Peripherals Inc.....	215
316	Comtrade.....	422
011	Corel Systems.....	23
086	Creative Labs, Inc.....	238
278	Crosstalk.....	127
037	Cyrix Corporation.....	283
298	Data Products.....	214
171	Datasouth Computer Corp.....	265
030	Dell Computer Corporation.....	C5-C8
029	Dell Computer Corporation.....	96-97
*	Dell Computer Corporation.....	208-209
166	Dell Computer Corporation.....	211
164	Dell Computer Corporation.....	298-299
125	DH Systems.....	455
002	Digital Products.....	357
239	Digital Research.....	362
097	Dustin Discount Software.....	47
168	Dustin Discount Software.....	82
017	Dustin Discount Software.....	410
347	Dustin Discount Software.....	416-417
362	Eastman Kodak.....	89
119	Edge Technology, Inc.....	431-433

Reader Service No.	Advertiser	Page
284	EPS Technologies.....	104
*	Everex.....	110
032	FASTMICRO.....	443-447
352	FASTMICRO.....	448-449
382/320	First Source International.....	469
200	FTG Data Systems.....	229
031	FTP Software.....	331
*	Gateway 2000.....	48a-m
391	H.Co Memory Upgrades.....	442
*	Hard Drives International.....	458-459
073	Hewlett Packard New Wave.....	116
*	Hewlett Packard PC's.....	339
*	Hewlett Packard PC's.....	341-343
*	Hewlett Packard Peripheral Group.....	6
275	Hyundai.....	162-165
024	IBM Corporation.....	84-85
066	IBM Corporation.....	142-143
*	IBM Corporation.....	303-306
044	ICOM Simulations.....	100
110	IMSI.....	119
*	Insight Computers.....	412-415
363	Intel Corporation.....	102-103
*	Intuit Software.....	90-91
378	Iomega Corporation.....	190
106	Kingston Technology Corp.....	315
055	Kodiak Technology.....	356
370	Kyocera Electronics.....	108-109
019	LA Trade.....	452
081	Lexmark International.....	41
098	Lexmark International.....	226-227
*	Librex Computer Systems.....	106-107
040	Lotus Development Corp.....	72-73
*	Lotus Development Corp.....	74-75
*	Lotus Development Corp.....	359-361
*	Lotus Development Corp.....	404
263	Macola Inc.....	4
067	MAG Innovision.....	257
056	Mannesman Tally.....	98
365	Manugistics (formerly STSC).....	139
050	MathSoft Inc.....	179
124	Matrox.....	264
*	Maxell.....	160
093	Media Vision.....	262
135	Merritt Computer Products, Inc.....	100
361	Micrografx.....	189
*	Microsoft.....	C2-C4,p1
*	Microsoft.....	266-267
*	Microsoft.....	290-291
225	MicroWarehouse Inc.....	284-287
010	Midwest Computer Works.....	464
371	Motorola Computer Group.....	230
108	Multi Tech Systems.....	83
394	NEC Technologies, Inc.....	26-27
157	NEC Technologies, Inc.....	156-157
156	NEC Technologies, Inc.....	318-319
*	Northgate Computer Systems.....	150-151
*	Northgate Computer Systems.....	333
*	Northgate Computer Systems.....	353
*	Novell, Inc.....	346-347

Reader Service No.	Advertiser	Page
155	Occidental, Inc.....	271-276
235	Okidata.....	20-21
*	Oracle.....	294
*	Pacific Data Products.....	280-281
145	Pacific Wave (Paradise).....	463
*	PC Brand.....	251-254
*	PC Connection.....	244-249
080	PC Power & Cooling.....	65
199	PC Zones.....	216-219
092	PCs Compleat.....	434-435
146	PCs Compleat.....	460
358	Peachtree Software.....	101
324	Peripheral Express.....	450
172	Philips Consumer Electronic.....	94
089	PKWARE.....	212
148	Primavera Systems.....	45
333	Primax.....	418
141	QMS.....	61-63
259	QMS.....	122-123
290	Rose Electronics.....	204
296	SAMTRON.....	184
*	Seagate.....	327
213	Sigma Data.....	263
373	Software Add-Ons.....	462
221	Statagic Mapping, Inc.....	70
057/059	StatSoft.....	213
365	STSC.....	139
191	Supra Corporation.....	67
104	Swan Technologies.....	323-324
279	SyDOS.....	125
344	Symantec.....	28
045	Tangent Computer, Inc.....	420-421
159	Teac Corporation of America.....	166
206	TELEMART.....	456-457
353	Texas Instruments.....	282
330	Thomas Conrad Corporation.....	334
379	Toshiba America.....	68-69
047	Toshiba Computer Display Group.....	114
121	Tri-Star Computer.....	10-11
173/174	Tripp Lite.....	345
231	U.S. Robotics, Inc.....	76
189	USA Flex.....	438-439
183	USA Flex.....	440-441
204	Vortex Computers.....	426
*	WordPerfect.....	16-17
*	WordPerfect.....	317
179	XSoft.....	206
*	XTREE-Div of Executive Systems.....	159
*	Zenith Data Systems.....	193-200
063	Zeos International.....	24-25
060	Zeos International.....	33
036	Zeos International.....	34-35
038	Zeos International.....	92
152	Zeos International.....	129-136
115/035	Zeos International.....	137
151	Zeos International.....	387-394

* No Reader Service #. Please Call Advertiser For Information.

Advertisers' Index

PRODUCTS

Reader Service No.	Company	Product	Page
ACCOUNTING SOFTWARE			
*	Intuit Software	Quickbooks	90-91
263	Macola Inc.	Accounting Software	4
358	Peachtree Software	Complete 6	101
373	Software Add-Ons	Mail Order	462
DESK TOP ORGANIZERS			
044	ICOM Simulations	Squeezes, Windows File Manager	100
DATA BASE MANAGERS			
100	Approach Software	Approach for Windows	309
285	Borland International	Dbase 4 1.5	54-55
400	Computer Associates	dB Fast	5
009	Computer Library	Support On Site	406
221	Statagic Mapping, Inc.	Mapping Software	70
INTEGRATED SOFTWARE			
*	WordPerfect	WordPerfect Works	16-17
OPERATING SYSTEMS/ENVIRONMENTS			
239	Digital Research	DR DOS 6.0	362
024	IBM Corporation	OS/2	84-85
PROJECT MANAGEMENT			
148	Primavera Systems	Primavera Project Planner	45
STATISTICAL SOFTWARE			
365	Manugistics (formerly STSC)	Statgraphics	139
050	MathSoft Inc.	MathCad 3.0	179
057/059	StatSoft	Statistical Software	213
365	STSC	Statgraphics	139
UTILITIES			
079	Central Point Software	AntiVirus	43
097	Dustin Discount Software	Stacker/OEMM	47
168	Dustin Discount Software	PC Kwik	82
073	Hewlett Packard New Wave	New Wave 4.0	116
344	Symantec	Norton Desktop for Windows	28
*	XTREE-Div of Executive Systems	Virusafe/Alsafe	159
WORD PROCESSING SOFTWARE/AIDS			
190	CallSoft	Word Processing Software	80
348	Computer Associates	CA-Textor	2-3
040	Lotus Development Corp.	Ami Pro 3.0	72-73
373	Software Add-Ons	Mail Order	462
*	WordPerfect	WordPerfect	317
SPREADSHEET/TEMPLATES			
287	Borland International	Quattro Pro Users	51
*	Lotus Development Corp.	Lotus 1-2-3 for DOS	404
*	Microsoft	Win Excel	C2-C4,p1
DESK TOP PUBLISHING			
190	CallSoft	Desktop Publishing	80
VERTICAL MARKET SOFTWARE			
050	MathSoft Inc.	MathCad 3.0	179
057/059	StatSoft	Statistical Software	213
EDUCATIONAL SOFTWARE			
017	Dustin Discount Software	AutoMap/BodyWorks	410
PRESENTATION SOFTWARE			
*	Lotus Development Corp.	Freelance Graphics for Windows	359-361
*	Microsoft	Power Point	290-291
MAPPING SOFTWARE			
017	Dustin Discount Software	AutoMap/BodyWorks	410
221	Statagic Mapping, Inc.	Mapping Software	70
WINDOWS SOFTWARE			
100	Approach Software	Approach for Windows	309
351	Banner Blue	Org Plus for Windows	231
190	CallSoft	Windows Software	80
348	Computer Associates	CA-Textor	2-3
400	Computer Associates	dB Fast	5
044	ICOM Simulations	Squeezes, Windows File Manager	100
098	Lexmark International	Windows Excelsator	226-227
040	Lotus Development Corp.	Ami Pro 3.0	72-73
*	Lotus Development Corp.	Lotus SmartSuite	74-75
*	Lotus Development Corp.	Freelance Graphics for Windows	359-361
263	Macola Inc.	Windows Software	4
050	MathSoft Inc.	MathCad 3.0	179
361	Micrografix	Picture Publisher	189
*	Microsoft	Win Excel	C2-C4,p1
*	Microsoft	PC Mail	266-267
*	Microsoft	Power Point	290-291
373	Software Add-Ons	Mail Order	462
057/059	StatSoft	Statistical Software	213
344	Symantec	Norton Desktop for Windows	28
179	XSoft	Room For Windows	206
DATA COMPRESSION SOFTWARE			
096	AddStor	SuperStor	58
089	PKWARE	PK Zip/PK Lite	212
ORGANIZATIONAL CHART SOFTWARE			
351	Banner Blue	Org Plus for Windows	231
ANTI-VIRUS SOFTWARE			
079	Central Point Software	AntiVirus	43

Reader Service No.	Company	Product	Page
IMAGE EDITING SOFTWARE			
361	Micrografix	Picture Publisher	189
SOFTWARE			
044	ICOM Simulations	Squeegie, Windows File Manager	100
092	PCs Compleat	Software	434-435
COMPATIBLE KEYBOARDS			
352	FASTMICRO	PC's	448-449
DISK BACKUP & TAPE DRIVES			
026	Colorado Memory Systems, Inc.	Jumbo Tape Backup	86
378	Iomega Corporation	Tape 250	190
HARD DISKS			
*	Seagate	ST1480	327
279	SyDOS	Puma	125
COMPUTERS/COMPATIBLES			
360	Acma Computers, Inc.	Acma PC's	18
099	Aurum Computers	Notebook Computers	120
012	Austin Computers	PC's	13-15
015	Buildog Computer Products	Compatibles	468
137	Compaq Computer Corporation	Desktops	180-183
126	CompuAdd	CompuAdd Systems	369-378
128	CompuAdd Express	CompuAdd Express Systems	169-178
132	COMPU DYNE	Desktop PCs	311-313
109	Computer Discount Warehouse	Resellers/Hardware/Software	465-467
316	Comtrade	Systems	422
030	Dell Computer Corporation	Dell Systems	C5-C8
029	Dell Computer Corporation	Dell Systems	96-97
*	Dell Computer Corporation	Dell Systems	208-209
166	Dell Computer Corporation	Dell Systems	211
164	Dell Computer Corporation	Dell Systems	298-299
119	Edge Technology, Inc.	Edge PC's	431-433
284	EPS Technologies	Compatibles	104
*	Everex	Step MP	110
032	FASTMICRO	PC's	443-447
*	Gateway 2000	PCs	48a-m
*	Hard Drives International	Hard Drives	458-459
*	Hawlett Packard PC's	HP PC's & Ethernet	339
*	Hawlett Packard PC's	HP PC's & Ethernet	341-343
275	Hyundai	386's, 486's	162-165
066	IBM Corporation	PS/2 Marketviews	142-143
*	Insight Computers	Systems	412-415
010	Midwest Computer Works	PCs	464
157	NEC Technologies, Inc.	Entry Systems	156-157
*	Northgate Computer Systems	Compatibles, PC's, Mail Order	150-151
*	Northgate Computer Systems	Compatibles, PC's, Mail Order	333
*	Northgate Computer Systems	Compatibles, PC's, Mail Order	353
155	Occidental, Inc.	486 SX-25, 486 DX-33, 486DX2-50	271-276
145	Pacific Wave (Paradise)	Mail Order, PC's, Software	463
*	PC Brand	PC's	251-254
199	PC Zones	Mail Order	216-219
092	PCs Compleat	Compatibles	434-435
146	PCs Compleat	Computers/Compatibles	460
333	Pnmax	Notebooks, Mail Order	418
104	Swan Technologies	PC's, Hardware, Software, Periph.	323-324
045	Tangent Computer, Inc.	PC'S	420-421
379	Toshiba America	T400SX	68-69
121	Tn-Star Computer	PC's	10-11
189	USA Flex	Mail Order	438-439
*	Zenith Data Systems	PC's	193-200
063	Zeos International	Zeos 486 EISA	24-25
060	Zeos International	Zeos Palmtop	33
036	Zeos International	Zeos 486 SLC	34-35
038	Zeos International	Zeos Color Notebook	92
152	Zeos International	Zeos Freestyle Notebook	129-136
115/035	Zeos International	Z-Card	137
151	Zeos International	Upgradables	387-394
INPUT DEVICES			
200	FTG Data Systems	Light Pen	229
110	IMS!	PC Systems	119
PROGRAMMERS TOOLS UTILITIES			
295	Borland International	Object Vision	53
*	Oracle	Oracle Card	294
MULTIFUNCTION BOARDS			
235	Okidata	DOC IT	20-21
ADD-ON BOARDS			
382/320	First Source International	Mail Order, Memory	469
213	Sigma Data	Processor Upgrades	263
SCANNERS/DIGITIZERS			
187	Canon, USA	CJ10	178
235	Okidata	DOC IT	20-21
PRINTERS			
111	ASP Computer Products	JetWay	88
187	Canon, USA	CJ10	178
298	Data Products	Printers	214
171	Datasouth Computer Corp.	XL Printer	265
002	Digital Products	Print Director	357
362	Eastman Kodak	Diconix 701	89
*	Hawlett Packard Peripheral Group	HP PSC Postscript	6

Advertisers' Index PRODUCTS

Reader Service

No.	Company	Product	Page
370	Kyocera Electronics	Ecosys	108-109
056	Mannesman Tally	Laser Printer	96
156	NEC Technologies, Inc.	Colormate Printer	318-319
324	Peripheral Express	Hardware/Peripherals	450
141	QMS	QMS 860 Laser Printer	61-63
259	QMS	PS-1700 Network Printer	122-123
353	Texas Instruments	MicroLaser Printer	282
183	USA Flex	Mail Order	440-441
183	USA Flex	Mail Order	440-441
115/035	Zeos International	Z-Card	137

FLOPPY DISK DRIVES

159	Teec Corporation of America	FD 505 Internal Floppy Disk	166
-----	-----------------------------	-----------------------------	-----

FONT CARTRIDGES

002	Digital Products	Print Director	357
*	Hewlett Packard Peripheral Group	HP PSC Postscript	6

WORKSTATIONS

012	Austin Computers	Workstations	13-15
-----	------------------	--------------	-------

PRINTER ACCESSORIES

111	ASP Computer Products	JetWay	88
328	Buffalo Products	Printer Sharing Solutions	442
*	Hewlett Packard Peripheral Group	HP PSC Postscript	6

MULTI-MEDIA

093	Media Vision	Thunder & Lightning	262
-----	--------------	---------------------	-----

HARDWARE

173/174	Tripp Lite	Surge Protectors, UPS	345
183	USA Flex	Mail Order	440-441

PERIPHERALS

092	PCs Complete	Peripherals	434-435
173/174	Tripp Lite	Surge Protectors, UPS	345

PORTABLE/LAP COMPUTERS

009	Aurum Computer	Notebook Computers	120
012	Austin Computers	Notebooks	13-15
190	CallSoft	Laptops	80
126	CompuAdd	CompuAdd Systems	369-378
128	CompuAdd Express	CompuAdd Express Systems	169-176
357	COMPUOYNE	Notebooks	235-237
030	Dell Computer Corporation	Dell Systems	C5-C8
029	Dell Computer Corporation	Dell Systems	96-97
*	Dell Computer Corporation	Dell Systems	206-209
106	Dell Computer Corporation	Dell Systems	211
164	Dell Computer Corporation	Dell Systems	258-259
065	Gateway 2000	Notebooks	48a-m
*	Kodak Technology	Noteport	356
*	Librex Computer Systems	386SL	106-107
*	Northgate Computer Systems	Compenibles, PC's, Mail Order	150-151
*	Northgate Computer Systems	Compenibles, PC's, Mail Order	333
*	Northgate Computer Systems	Compenibles, PC's, Mail Order	353
198	PC Zones	Mail Order	216-219
333	Primax	Notebooks, Mail Order	418
104	Swan Technologies	PC's, Hardware, Software, Periph	323-324
379	Toshiba America	T400SX	68-69
109	USA Flex	Mail Order	438-439
204	Vortex Computers	Portable Computers	426
*	Zenith Data Systems	Notebooks	193-200
038	Zeos International	Zeos Color Notebook	92
152	Zeos International	Zeos Freestyle Notebook	129-136
152	Zeos International	Edge PC's	129-136

PC-FAX

105	Computer Peripherals Inc.	14.4 Modem/Fax	215
191	Supra Corporation	V.32 Fax/Modem	67

CO-PROCESSORS

037	Cyrix Corporation	Cyrix FasMath Coprocessor	283
213	Sigma Data	Workstation, Math Co-Processor	263

OPTICAL PERIPHERALS

199	PC Zones	Mail Order	216-219
-----	----------	------------	---------

MEMORY

382/320	First Source International	Memory	469
381	H.Co Memory Upgrades	Memory	442
108	Kingston Technology Corp.	Memory	315
019	LA Trade	Memory	452
213	Sigma Data	Memory Upgrades	263

TIME MANAGEMENT SOFTWARE

381	Computer Associates	Up-To-Date	292-293
-----	---------------------	------------	---------

CD-ROM

009	Computer Library	Support On Site	406
159	Computer Library	Computer Select	409

CHIPS/PROCESSORS

037	Cyrix Corporation	Cyrix FasMath Coprocessor	283
363	Intel Corporation	Overdrive Processors	102-103

MASS STORAGE

*	Maxell	Tape Back-Up	180
279	SyDOS	Puma	125

Reader Service

No.	Company	Product	Page
DISPLAYS/MONITORS/TERMINALS			
109	Computer Discount Warehouse	Monitors/Laptops/Modems	465-467
067	MAG Innovation	Monitors	257
010	Midwest Computer Works	Monitors	464
394	NEC Technologies, Inc.	5FG Monitor	26-27
172	Philips Consumer Electronic	Philips Monitors	94
256	SAMTRON	Monitors	184
104	Swan Technologies	PC's, Hardware, Software, Periph	323-324
047	Toshiba Computer Display Group	Toshiba Monitors	114
183	USA Flex	Mail Order	440-441

GRAPHICS SOFTWARE

400	Computer Associates	dB Fast	5
011	Corel Systems	Corel Draw 3.0	23
*	Lotus Development Corp.	Freelance Graphics for Windows	359-361
361	Micrografix	Picture Publisher	189
221	Statagic Mapping, Inc.	Mapping Software	70

PLOTTERS/CHARTING DEVICES

*	Pacific Data Products	ProTracer	280-281
---	-----------------------	-----------	---------

VIDEO GRAPHICS/BOARDS

337	ATI Technologies Inc.	ATI Graphics Accelerators	280-281
086	Creative Labs, Inc.	Video Blaster	238
382/320	First Source International	Mail Order, Memory	469
124	Matrox	Impression 10-24 Accelerator	264
104	Swan Technologies	PC's, Hardware, Software, Periph	323-324
183	USA Flex	Mail Order	440-441

COMMUNICATIONS SOFTWARE

292	Caere Corporation	Fax Master	78-79
278	Crosstalk	MarkNet	127
031	FTP Software	PC/TCP Plus	331
263	Macola Inc.	Accounting & Windows Software	4
108	Multi Tech Systems	Communication Software	83

LOCAL AREA NETWORKING

293	3 Com	Ethernet Adaptor	288-289
254	Artisoft	LANtastic	221
*	Asante Technologies	Smart Hub	36
111	ASP Computer Products	JetWay	88
109	Computer Discount Warehouse	Networking Products	465-467
002	Digital Products	Print Director	357
031	FTP Software	PC/TCP Plus	331
*	Hewlett Packard PC's	HP PC's & Ethernet	339
*	Hewlett Packard PC's	HP PC's & Ethernet	341-343
*	IBM Corporation	Token Ring	303-306
055	Kodak Technology	Noteport	356
108	Multi Tech Systems	Multiplexors, Hubs	83
*	Novell, Inc.	Networking	346-347
324	Peripheral Express	Hardware/Peripherals	450
259	QMS	PS-1700 Network Printer	122-123
290	Rose Electronics	Video Switch/ServeView	204
330	Thomas Conrad Corporation	Token Ring Products	334

MICRO-MAINFRAME LINKS

*	IBM Corporation	Token Ring	303-306
---	-----------------	------------	---------

MODEMS

105	Computer Peripherals Inc.	14.4 Modem/Fax	215
382/320	First Source International	Mail Order, Memory	469
108	Multi Tech Systems	Pocket Modems	83
191	Supra Corporation	V.32 Fax/Modem	67
231	U.S. Robotics, Inc.	Couner Modem	76

MULTIUSER SYSTEMS

235	Okidata	DOC IT	20-21
-----	---------	--------	-------

PERIPHERAL SHARING DEVICE

111	ASP Computer Products	JetWay	88
328	Buffalo Products	Printer Sharing Solutions	442
002	Digital Products	Print Director	357
290	Rose Electronics	Video Switch/ServeView	204

SERVERS

371	Motorola Computer Group	Server	230
045	Tangent Computer, Inc.	File Servers	420-421

REMOTE COMPUTING

278	Crosstalk	MarkNet	127
-----	-----------	---------	-----

DATA CARTRIDGES/FLOPPY DISKS

130	BASF Corp.	Diskettes	330
-----	------------	-----------	-----

POWER PROTECTION

162	American Power Conversion	Back-UPS	332
080	PC Power & Cooling	Power Supplies	85
173/174	Tripp Lite	Surge Protectors, UPS	345

SECURITY

173/174	Tripp Lite	Surge Protectors, UPS	345
---------	------------	-----------------------	-----

PC ACCESSORIES

135	Merritt Computer Products, Inc.	SafeSkin Keyboard Protector	100
173/174	Tripp Lite	Surge Protectors, UPS	345

MAIL ORDER

360	Acma Computers, Inc.	Acma PC's	18
336	Arlington Computer Products	Mail Order	436

Advertisers' Index PRODUCTS

Reader Service

No.	Company	Product	Page
012	Austin Computers	Mail Order	13-15
015	Buildog Computer Products	Mail Order	468
190	CalSoft	Mail Order	80
126	CompuAdd	CompuAdd Systems	369-378
126	CompuAdd Express	CompuAdd Express Systems	169-176
205	Compuclassics	Mail Order Products	454
357	COMPU DYNE	Mail Order	235-237
132	COMPU DYNE	Mail Order	311-313
300	Computability	Mail Order	461
400	Computer Associates	Mail Order	5
109	Computer Discount Warehouse	Resellers/Hardware/Software	465-467
316	Comtrade	Mail Order	422
030	Dell Computer Corporation	Dell Systems	C5-C8
029	Dell Computer Corporation	Dell Systems	96-97
*	Dell Computer Corporation	Dell Systems	208-209
166	Dell Computer Corporation	Dell Systems	211
164	Dell Computer Corporation	Dell Systems	299-299
125	DH Systems	Mail Order Products	455
347	Dustin Discount Software	Mail Order Products	416-417
119	Edge Technology, Inc.	Edge PC's	431-433
284	EPS Technologies	Mail Order	104
032	FASTMICRO	Mail Order	443-447
352	FASTMICRO	Mail Order	448-449
362/320	First Source International	Mail Order	469
*	Gateway 2000	Mail Order	48a-m
391	H.Co Memory Upgrades	Mail Order	442
275	Hyundai	386's, 486's	162-165
*	Insight Computers	Mail Order	412-415
019	LA Trade	Mail Order	452
225	MicroWarehouse Inc.	Mail Order	284-287
010	Midwest Computer Works	Mail Order	464
*	Northgate Computer Systems	Compables, PC's, Mail Order	150-151
*	Northgate Computer Systems	Compables, PC's, Mail Order	333
*	Northgate Computer Systems	Compables, PC's, Mail Order	353
159	Occidental, Inc.	486 SX-25, 486 DX-33, 486DX2-50	271-276
145	Pacific Wave (Paradise)	Mail Order, PC's, Software	463
*	PC Brand	Mail Order	251-254
*	PC Connection	Mail Order	244-249
199	PC Zones	Mail Order	216-219
082	PCs Complete	Mail Order	434-435
146	PCs Complete	Mail Order	452
324	Peripheral Express	Hardware/Peripherals	450
333	Primax	Notebooks, Mail Order	418
373	Software Add-Ons	Mail Order	462
104	Swan Technologies	PC's, Hardware, Software, Periph.	323-324
045	Tangent Computer, Inc.	Mail Order	420-421
206	TELEMART	Mail Order	456-457
121	Tri-Star Computer	Mail Order	10-11
189	USA Flex	Mail Order	438-439
183	USA Flex	Mail Order	440-441
204	Vortex Computers	Portable Computers	426
*	Zenith Data Systems	Mail Order	193-200
063	Zeos International	Zeos 486 EISA	24-25
060	Zeos International	Zeos Palmtop	33
036	Zeos International	Zeos 486 SLC	34-35
038	Zeos International	Zeos Color Notebook	92
152	Zeos International	Zeos Freestyle Notebook	129-136
151	Zeos International	Upgradables	387-394

ELECTRONIC MAIL

*	Microsoft	PC Mail	266-267
---	-----------	---------	---------

RESELLERS

010	Midwest Computer Works	Reseller	464
-----	------------------------	----------	-----

ORGANIZATIONS/SERVICES

081	Lexmark International	Corporate Campaign	41
-----	-----------------------	--------------------	----

PC DIRECT

336	Arlington Computer Products	Mail Order	436
328	Buffalo Products	Printer Sharing Solutions	442
015	Buildog Computer Products	Mail Order, Compatibles	468
205	Compuclassics	Mail Order Products	454
300	Computability	Mail Order	461
109	Computer Discount Warehouse	Resellers/Hardware/Software	465-467
316	Comtrade	Mail Order, Systems	422
125	DH Systems	Mail Order Products	455
017	Dustin Discount Software	AutoMap/Body/Works	410
347	Dustin Discount Software	Mail Order Products	416-417
119	Edge Technology, Inc.	Edge PC's	431-433
032	FASTMICRO	PC's, Mail Order	443-447
352	FASTMICRO	PC's, Mail Order	448-449
362/320	First Source International	Mail Order, Memory	469
391	H.Co Memory Upgrades	Mail Order, Memory	442
*	Hard Drives International	Mail Order, Hard Drives	458-459
*	Insight Computers	Mail Order, Systems	412-415
019	LA Trade	Mail Order, Memory	452
010	Midwest Computer Works	Mail Order	464
145	Pacific Wave (Paradise)	Mail Order, PC's, Software	463
092	PCs Complete	Mail Order, Compatibles	434-435
146	PCs Complete	Mail Order	460
333	Primax	Notebooks, Mail Order	418
373	Software Add-Ons	Mail Order	462
045	Tangent Computer, Inc.	Mail Order, PC's, File Servers	420-421
206	TELEMART	Mail Order	456-457
189	USA Flex	Mail Order	438-439
183	USA Flex	Mail Order	440-441
204	Vortex Computers	Portable Computers	426

For Additional Product Categories See MARKETPLACE PRODUCT INDEX Page 471



Coming Up

DOS Lives!

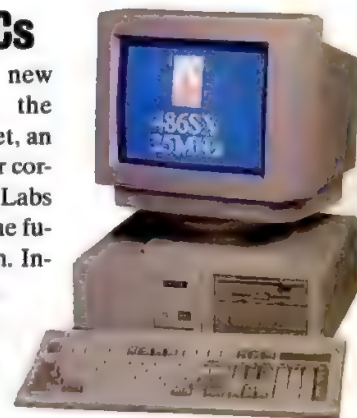
DOS lives! Make no mistake about it. Most PCs in the business world are still running this low-overhead, speedy standby as their one and only operating system. We will look at each major category of software in turn, and tell you where DOS shines, where it's weak, and what new products are available. We also provide some tips and tricks for improving memory management under DOS.

16Mb Token-Ring Adapters

With more players in the market, Token-Ring networking is cheaper—and more flexible—than ever. *PC Magazine* reviews 16-megabit Token-Ring adapters that support shielded twisted-pair and ODI and NDIS drivers. We rounded up 8-, 16-, and 32-bit adapters for ISA, EISA, and MCA architectures, and sent them to ZD Labs for intensive testing. The results, in more cases than one, were not what we expected.

25-MHz 486SX PCs

Intel's introduction of the new OverDrive chip has made the 486SX/25, with its vacant socket, an attractive entry-level system for corporate desktops. *PC Magazine* Labs tests 58 machines banking on the future of this upgradeable design. Included are systems from ALR, Amkly, Ariel Design, Compaq, Compudyne, Dell, Gateway 2000, IBM, NCR, NEC, and Northgate.



The Best Utilities

What is the best tool for retrieving a file you accidentally erased or for tracking down that report you know is there somewhere? How do you copy a bunch of files more simply than with DOS? What's the cheapest way to speed up Windows? How do you convert a graphic file from one format to another? *PC Magazine's* editors provide the answers by picking their favorite utilities.

Utilities

Take a quick look around any office today and you'll see a constantly changing screen-saver display on the monitor at every unoccupied desk. BUGS, next issue's utility, will not only give you another screen saver to add to your collection, but it will also give you a set of routines so you can create your own.

Editorial Product Index

Reader Service No.	Product	Company	Page
COMPUTERS			
429	IBM 486SLC2 Processor Upgrade	IBM Corp.	46
HARDWARE			
490	ADDA VGA-AVer	ADDA Technologies Inc.	258
491	Aitech ProVGA/TV Plus	Aitech International Corp.	263
484	Altec Lansing ACS300	Altec Lansing Consumer Products	500
485	Bose Roommate Computer Monitor	Bose Corp.	500
492	Cardinal SNAPplus	Cardinal Technologies Inc.	269
428	VideoBlaster	Creative Labs Inc.	42
493	Everex Vision VGA with Overlay	Everex Systems Inc.	277
408	GammaFax MLCP-4	GammaLink	64
494	Genoa VGA2TV	Genoa Systems Corp.	278
403	HP DesignJet 600	Hewlett-Packard Co., Direct Marketing Organization	59
421	TAPE250 Insider	Iomega Corp.	52
495	Magni VGA Producer Pro	Magni Systems Inc.	278
417	Pro AudioSpectrum 16	Media Vision Inc.	49
486	Persona PC	Persona Technologies	500
486	Persona Sub Woofer	Persona Technologies	500
487	Roland MA-12C Micro Monitor	Roland Corp.	500
496	Truevision VideoVGA	Truevision Inc.	283
405	WIN.VGA	Video Seven, a division of Headland Technology Inc.	60
497	Willow VGA-TV GE/O	Willow Peripherals	289
430	Xante Accel-a-Writer	Xante Corp.	48
READ ONLY			
482	Visual Basic How-To	Waite Group Press	71
483	Building Local Area Networks	M&T Books	48
SOFTWARE			
463	HotWin, Version 2.0a	Abacist Software Co.	138
459	BeckerTools, Version 3.0	Abacus Software Inc.	124
426	Aldus IntelliDraw, Version 1.0	Aldus Corp.	37
476	Aldus PhotoStyler, Version 1.1a	Aldus Corp.	188
456	Amish Utilities for Windows, Version 1.0	Amish Software Inc.	115
410	WinDings, Version 1.0	Application Techniques Inc.	59
419	FontMonger, Version 1.0	Ares Software	48
457	AttTools, Version 1.0	Attitash Software Inc.	117
402	Autodesk 3D Concepts for Windows, Version 1.0	Autodesk Inc.	60
420	ManagePro for Windows, Version 1.0	Avantos Performance Systems Inc.	44

425	Quattro Pro for Windows, Version 1.0	Borland International	37
416	QuickMail, Version 2.5	CE Software Inc.	66
501	Forest & Trees for Windows, Version 2.0d	Channel Computing Inc.	307
498	ClearAccess for Windows, Version 1.0	ClearAccess Corp.	297
407	PARISS Enterprise, Version 1.0	Computer Aided Management Inc.	64
434	DeltaGraph Professional for Windows, Version 2.0	DeltaPoint Inc.	56
409	Enable Works plus, Version 1.0	Enable Software Inc.	59
460	Direct Access Windows, Version 1.0	Fifth Generation Systems Inc.	126
488	EZSound FX, Version 1.0	Future Trends Software	510
500	Quest, Version 1.2.0	Gupta Technologies Inc.	302
462	hDC Power, Launcher, Version 2.0	hDC Computer Corp.	128
466	NewWave, Version 4.0	Hewlett-Packard Co.	147
472	Squeegie, Version 1.0	ICOM Simulations Inc.	158
477	Image-In-Color, Version 3.0	Image-In Inc.	201
477	Image-In-Color, Professional, Version 3.0	Image-In Inc.	201
423	HiJaak for Windows, Version 1.0	Inset Systems	50
422	XtraDrive, Version 1.0	Integrated Information Technology Inc.	52
489	Star Trek: 25th Anniversary	Interplay Productions	500
504	JAM/DBi for DOS, Version 5.0	JYACC Inc.	318
412	DescriptionsWrite Now!, Version 1.0	KnowledgePoint	66
404	PrimeType	Laser Tools Corp.	59
406	Symphony, Release 3	Lotus Development Corp.	64
451	KEDIT, Version 5.0	Mansfield Software Group Inc.	77
505	ObjectView, Version 1.10	Matesys Corp.	322
465	METZ Task Manager, Version 2.0	METZ Software Inc.	141
480	Picture Publisher, Version 3.1	Micrografx Inc.	223
427	R:BASE, Version 4.0	Microrim Inc.	42
474	WinEZ Pro, Version 1.0	New Generation Software Corp.	168
411	Wordlinx, Version 1.0	Ocron Inc.	64
503	LightShip, Version 3.01	Pilot Software Inc.	308
503	LightShip Lens, Version 3.0	Pilot Software Inc.	308
424	Pinnacle PMO-650	Pinnacle Micro Inc.	50
481	PixoFoto, Version 1.0	PixoArts Corp.	231
506	PowerBuilder, Version 2.0	PowerSoft Corp.	326
401	QuarkXPress 3.1 for Windows	Quark Inc.	59
432	Skylight, Version 2.0	RenaSonce Group Inc.	46
470	Sloop Manager, Version 2.0	Sloop Software	155
415	filePro Plus, Version 4.1	The Small Computer Co. Inc.	66
464	K-U-I, Version 1.0	Softac Corp.	141
471	SmartPad for Windows, Version 1.0	Softblox Inc.	158
502	InfoAlliance for Windows, Version 1.10	Software Publishing Corp.	314
499	Personal Access, Version 1.5	Spinnaker Software Corp.	301
458	BackDesk, Version 2.32	SP Services	117
467	The Norton Desktop for Windows, Version 2.0	Symantec Corp.	149
418	NetWorks! Connect	Symbiotics Inc.	49
473	Synergy, Version 1.0	SynApps Software Inc.	161
435	Stanford Graphics for Windows, Version 2.0	3-D Visions	56
475	WinTools, Version 1.0a	Tool Technology Publishing Inc.	168
478	ImagePals, Version 1.0	U-Lead Systems Inc.	205
431	N/Joy The World of Objects, Version 2.0	Vienna Software Publishing Inc.	57
469	Salvation, Version 1.1	Vitesse Inc.	154
468	Ready, Aim, FILE! for Windows, Version 2.0	VSoft Development Corp.	153
461	File Commander, Version 1.1	Wilson WindowWare Inc.	126
414	WordStar for Windows, Version 1.5	WordStar International Inc.	66
479	PhotoFinish, Version 1.01	ZSoft Corp.	210
479	Publisher's Paintbrush, Version 2.02	ZSoft Corp.	210

PROGRAMMING

Utilities.....	Keep Indispensible Applications Handy with TOTOP.....	363
Lab Notes.....	Accessing the Windows API from the DOS Box, Part 3.....	379
Environments.....	MCI, MIDI, and the Windows 3.1 ToolHelp DLL, Part 3.....	395
Power Programming.....	The Windows 3.1 ToolHelp DLL, Part 3.....	399
Databases.....	Tighten up negative-number parentheses in FoxPro.....	405
Languages.....	Enhance string searching by adding a Soundex routine to BASIC programs.....	407

SOLUTIONS

Advisor.....	Using PC Magazine's MultiBoot utility with DOS 5.0.....	419
Advisor.....	Identifying unnecessary files on your hard disk.....	419
Tutor.....	Adding an audible disk-swap prompt to DISKCOPY.....	423
User-to-User.....	View and edit all the properties of DOS programs under Windows.....	427
User-to-User.....	Update your PATH without retyping the PATH variable.....	427
Spreadsheets.....	Two macros that make it easy to select a directory.....	437
The Working Word.....	Upgrade your printer drivers without losing your paper definitions.....	451
Connectivity.....	Using 3270 adapters and cable for LAN access.....	453
Connectivity.....	Making connections between buildings with fiber-optic cable.....	453

After Hours

SPEAKERS: Altec Lansing ACS300, Bose Roommate Computer Monitor, Persona PC, Roland MA-12C Micro Monitor

SOUND: EZSound FX **GAMES:** Star Trek: 25th Anniversary

SPEAKERS

Listen Up! External Loudspeakers Bring High-Fidelity Sound to Your PC

BY JOHN R. QUAIN

No matter how much multimedia equipment you have, if you play Beethoven's Ninth through your PC's 2-inch speaker, people will plug their ears. Successful business presentations, multimedia applications, and MIDI work demand external high-fidelity stereo speakers.

Though you could adapt standard hi-fi speakers for use with a computer, a number of obstacles make them inappropriate for such use. First, most speakers are too big to sit on your desk, and if you place them too far apart, as you may need to do, you will lose the stereo effect.

Second, sound boards offer little or no power to drive external speakers. Some cards have small 4-watt amplifiers, but that is not enough to drive quality speakers, and such designs tend to add distortion.

Third, because the speakers are likely to sit near your display, they may create magnetic interference, which can distort colors and objects on-screen.

To solve these problems, computer speakers need to be small, efficient, and self-powered. Also, magnetic shielding needs to be used, ei-

ther in the form of added layers of insulation in the speaker cabinet or by electronically canceling out the magnetic distortion.

In this section, we look at four sets of speakers: Altec Lansing ACS300s, Bose



The Altec Lansing ACS300's clamshell design is versatile and compact, and the separate subwoofer can be hidden under a desk.

Roommate Computer Monitors, Persona PCs, and Roland MA-12C Micro Monitors. All are self-powered and magnetically shielded. Most will fit on your desktop, and each will reproduce high-quality sound for an audience of one or twenty. Furthermore, though you can connect these speakers directly to a CD-ROM drive or stereo component, we recommend using them with a sound card, preferably one with a 16-bit design. An 8-bit sound card can make excellent speakers sound tinny.

In our evaluation, we connected the speakers to 8- and 16-bit audio cards and listened to them under several desktop multimedia working conditions. For overall performance and sound, we felt the ACS300 from Altec Lansing Consumer Products was best for serious desktop audio. The lower-priced Persona PCs were close in terms of sonic accuracy, but the ACS300's design proved more flexible.

All the speakers evaluated here provide sound quality light years beyond what your PC can deliver. Ultimately, though, choosing the right speakers is a highly subjective affair. Make sure you audition the speakers before you buy them. There are dozens of models on the market, ranging from less expensive minispeakers from Sony and Koss to larger self-powered models from companies such as AR.

ALTEC LANSING ACS300

Altec Lansing Consumer Products has been in the sound



Though somewhat bulky, Bose Roommate Computer Monitor speakers are good traveling choices, thanks to their ruggedness and simplicity of setup.

business since 1927. The three-piece Altec Lansing ACS300 is Altec's first foray into the PC arena, and it's impressive.

The \$400 ACS300's unique look reflects the fact that this speaker system was designed specifically for the PC. Two clamshell satellite speakers provide the midrange and treble part of the sound, and a lunch-box size subwoofer delivers the bass end.

Though satellite designs are nothing new in the audio world, the clamshell shape is a definite innovation. By adjusting the open angle of the clamshells, the listener can position the speakers precisely, so that none of the sound is muffled on the desktop. You can also close the clamshells when you're done using them.

The shape and size of the two satellite speakers (3.5 by 5 by 7 inches, HWD) allow you to mount them on a wall, place them beside your monitor, or stand them on your desk. Each satellite has a 4-inch woofer and a half-inch dome tweeter. The accompanying subwoofer picks up where the satellites leave off, reproducing bass notes below 120 Hz. The subwoofer, though not magnetically shielded, can be hidden under a desk.

Altec includes inputs and a control for mixing two audio sources. Additional controls include volume, treble, bass, balance, and digital signal processing (DSP) enhancement. The DSP control adjusts the sound to increase the sense of stereo separation.

Speakers

ration. The only item that is lacking is a headphone jack.

Altec's ACS300 has a 9-watt-per-channel amplifier and a rated frequency response of 35 Hz to 20 kHz (+ or - 3 decibels), with total harmonic distortion (THD) less than 0.8 percent. Ears-on evaluations attested to the accuracy of these speakers playing a variety of music, from string quartets to jazz trumpet. The only area where we detected occasional softness was in deep organ bass passages. All in all, the ACS300s are a remarkably well-rounded set of speakers for any listening environment.

Altec Lansing ACS300, \$400.

Altec Lansing Consumer Products, Rt. 6 & 209, P.O. Box 277, Milford, PA 18337-0277; 800-548-0620, 717-296-4434; fax, 717-296-2213.

Circle 484 on reader service card

BOSE ROOMMATE COMPUTER MONITOR

A familiar name in audio ever since the 901 Direct/Reflecting speakers were introduced in 1968, Bose Corp. has years

of experience building self-powered speakers. And though PC users have only recently paid attention to external speakers, the \$339 Bose Roommate Computer Monitors have been popular with Macintosh devotees for some time.

Housed in tough 6-by 9-by 6-inch (HWD) molded styrene cabinets, this pair of speakers is a variation on previous single-driver designs (in which woofer, midrange, and tweeter are built into the same unit). Consequently, setup is simple, but—like the Roland speakers—the size makes the speakers a bit clumsy for tabletop settings. Despite their size, the Roommates are durable enough to survive planes, trains, and automobiles, making them best suited for presentations on the road.

Bose kept the controls simple. One volume knob adjusts the level of both speakers; most other adjustments are made automatically, including dynamic equalization to ensure the proper proportion of

high and low frequencies at loud and quiet volumes.

Disputes over speaker specifications are legend in the world of audio components, and Bose takes a hard line by not publishing the speakers' "rated specs." During audi-



You can attach Persona PC speakers to your PC's monitor or place them on your desk. These speakers are relatively inexpensive and deliver accurate sound.

tions with various sound boards, the Roommates proved they have power to spare, but they fell short in terms of audio fidelity. Classical music in particular suffers because the speakers tend to boom or turn muddy in the bass end. And because the speakers have no tone controls, you must rely on your sound board's controls to make the proper adjustments.

Bose Roommate Computer Monitor, \$339. Bose Corp., The Mountain, Framingham, MA 01701; 800-444-2673, 508-879-7330.

Circle 485 on reader service card

PERSONA PC

Among the models evaluated here, the Persona PC speakers are arguably the best desk-top solution. Measuring 9 by 4 by 5 inches (HWD), they can sit inconspicuously on your desk or be attached, like ears, to the sides of your monitor. And at \$230 for the pair, they represent a significant value, delivering accurate sound and several convenient features.

The Persona PCs are three-way speakers. Each contains a 3-inch woofer, a 2-inch midrange driver, and a piezo ribbon tweeter. Persona Technologies rates the speakers' amplifier at 10 watts per channel with 0.5 percent total harmonic distortion. It is enough clean power to disturb your neighbors, but it is not enough for a presentation in a large hall.

On the left side of the speaker are controls for volume, stereo separation, and bass. On the back are inputs for one audio source and a pair of headphones. The headphone jack is particularly useful in crowded offices or late at night. When you plug in the headphones, the speakers are automatically muted, and you can still adjust the volume with the volume control.

The frequency response of the Persona PCs is rated at 75 Hz to 18 kHz (+ or - 3 decibels). Although this is short of the 20 Hz to 20 kHz audible range of frequencies, virtually no speaker system covers the entire range.

■ Spec Talk: Know Your Sound Terms

Choosing speakers is a befuddling process, and speaker specifications don't help much. Though there is often a lack of correlation between good specs and good speakers, it helps to know the terms you'll encounter.

Drivers: The individual speaker components, such as tweeters and woofers, that create the sound. Separate drivers do not guarantee better sound.

Efficiency: An efficient, or sensitive, speaker is one that requires a small amount of power to achieve significant loudness (measured in decibels).

Frequency Response: Stated in hertz (with a deviation of + or - 3 decibels), frequency response is a measurement of the range of

high and low sounds a speaker can reproduce. The ideal range is from 20 Hz to 20 kHz, though no speaker system reproduces this range perfectly, and few people hear above 18 kHz. Frequency response is the most deceptive specification, because identically rated speakers can sound completely different.

Total Harmonic Distortion (THD): THD is an expression of the amount of distortion or noise created by amplifying the signal.

Watts: Usually stated as watts per channel, this is the amount of amplification available to drive the speakers. Check that the company means "per channel" (or rms) and not total power.—J.R.Q.

Speakers

Persona PC speakers faithfully reproduce everything from classical music to rock music. High notes were not noticeably constrained, and the speaker's sonic-imaging control helped improve stereo separation. Low bass passages lacked the depth that is needed to properly cover notes in the 40 to 50 Hz range, however. For those users who want better bass response, Persona Technologies offers the Persona Sub Woofer. This \$200 component is equipped with a 25-watt amplifier and covers the bass range from 40 to 150 Hz.

Persona PC, \$230; Persona Sub Woofer, \$200.

Persona Technologies,
274 Wattis Way, South San Francisco, CA 94080-6761;
415-871-6000.

Circle 486 on reader service card

ROLAND MA-12C MICRO MONITOR

Serious MIDI users, professional musicians, and composers will appreciate the \$290 Roland MA-12C Micro Monitors, the most rugged and adaptable speakers in this



Ideal for MIDI users, Roland MA-12C speakers have inputs for a CD player or audio card, a microphone, and an instrument hookup.

roundup. Each speaker has three full-size RCA jack inputs located on the back: a line input (to be used for a CD player or an audio card), a microphone input, and an instrument hookup—perfect for MIDI users.

These speakers lack a headphone jack, but Roland Corp. makes up for this missing feature by providing something the others don't: an on/off power button on each speaker. Though the MA-12Cs use magnetically shielded speaker drivers, driving them at full power may interfere with some monitors. For good stereo separation and a distortion-free video display, place the speakers about 8 inches from your monitor.

Measuring 8.5 by 5 by 6.25 inches (HWD), the Roland speakers may be a little too large for typical desktops, but the thick plastic speaker cabinets and heavy-duty power cords make them extremely roadworthy. Each speaker has a single driver and an independent 10-watt power amplifier with individual controls for volume, bass, and treble.

The speakers are efficient

enough to blast a room full of sales reps flat or make your neighbors think aliens are attacking your home. They employ an active equalization circuit to maintain balance at both low and high volumes without undue distortion.

Like Bose Corp., Roland doesn't provide ratings for the speakers' frequency response or total harmonic distortion. You may find the MA-12Cs have a more pronounced high end than typical speakers. Cymbal crashes, for example, dominate the sound more than they should. Many listeners prefer this quality to more accurate speakers. Fortunately, the treble and bass controls provide enough leeway so you can adjust the sound quality to your liking.

Roland MA-12C Micro Monitor, \$290. Requires: connecting cables. Roland Corp., 7200 Dominion Circle, Los Angeles, CA 90040; 213-685-5141.

Circle 487 on reader service card

SOUND

EZSound FX Adds Sound Effects To Everyday Windows Functions

BY BARRY SIMON

What is the sound of a window being sized? A file being deleted from your hard disk? Future Trends Software's EZSound FX lets you decide for yourself.

The \$69.95 package brings a complete set of sound utilities to Windows: sound effects for Windows events, a digital sound editor, digital sound file conversion, a synthesized music player, a CD player, and a sound control panel.

EZSound comes in two flavors: DigitFX, which uses digitized

sounds, and SynthFX, which uses synthesized sounds. EZSound recommends using Windows 3.1 Multimedia drivers, but supports sound boards from AdLib and Covox, as well as Creative Labs' Sound Blaster, and Media Vision's Pro Audio Spectrum and ThunderBoard cards, even under Windows 3.0.

The digitized sound editor lets you read in one of eight supported file formats (including .WAV, .VOC, Mac, and Amiga). You can also

capture sound from an external microphone. After you edit the sounds, you can save them to disk in any of the program's eight file formats. There is no batch mode for file conversion.

EZSound is a lot of fun to use. You can play music in the background or in a windowed

(not full-screen) DOS session. Or you can assign some appropriate sounds to Windows events—for example, a stretching sound when you resize your windows, or a door slamming shut when you close an application.

The program comes with more than 100 synthesized and 50 digitized sound files.



EZSound FX includes an ROL player, a control panel, and a digital sound editor. You can play both synthesized and digital sound files.

EZSound FX, Version 1.0, \$69.95. Requires: Windows 3.x, Multimedia Sound driver for Windows 3.1, sound card, 2.8MB disk space (full installation). Future Trends Software, 1508 Osprey Dr., #103, DeSoto, TX 75115; 214-224-3288; fax, 214-224-3328.

Circle 488 on reader service card

GAMES

Interplay's Star Trek: Back to the Roots of Computing

BY BERNIE YEE

No Star Trek game captures the pioneer spirit of the original television series as well as Star Trek: 25th Anniversary. Interplay Productions' \$49.95 game puts you in command of the U.S.S. Enterprise. Your crew, immediately familiar and welcome, assists you in space and planetside. It's almost like having new episodes without the wrinkles and excess weight that characterize the Star Trek movies.

Gameplay is divided into real-time space combat and graphic adventure sequences.

Space combat uses 3-D bitmapped starships and battlecruisers reminiscent of Origin's Wing Commander. You enter mock combat with another Federation heavy cruiser, Klingons, Romulans, and the pirate Elasi. Though a bit simplistic, it's good fun to blast away. Purists may complain that the game is too arcade-like, but neither Star Trek/25 nor the series was designed to be a combat simulator. The crew members control their stations, which keep you on top of all the ship's systems. The point-and-click in-



New episodes without the wrinkles: Star Trek: 25th Anniversary remains faithful to the television series and adds the dimension of excellent game play.

terface is easy to learn.

The graphic adventure begins when you beam down to carry out your first mission. Most of the game is devoted to puzzle solving or exploring the unknown. The members of your landing party give you advice from their own perspectives; McCoy dishes out his Southern cynicism and

Spock offers his scientific opinions. The adventures are especially well-constructed.

Interplay made even the smallest details true to the television series, from the series music and various subthemes to the transporter effects. Interplay doesn't disappoint in terms of plot or playability, either; the initial mock combat and adventure scenarios are perfect for getting your

Trek legs. Go ahead—it's a universe of fun. □

Star Trek: 25th Anniversary, \$49.95. Requires: 640K RAM, DOS 3.x or later. Interplay Productions, 3710 South Susan, #100, Santa Ana, CA 92704; 714-545-9001; fax, 714-549-5075.

Circle 489 on reader service card

DON'T GIVE MONEY TO STRANGERS.

Before you give to a heart organization, make sure it's one you trust: The American Heart Association. Since 1924 we've sponsored lifesaving education programs and funded \$900 million in research. Others may copy us, but they can't hold a candle to our heart and torch. To learn more, contact the American Heart Association, 7320 Greenville Ave., Box 20, Dallas, TX 75231.

You can help prevent heart disease. We can tell you how.



American Heart Association

This space provided as a public service.

Abort, Retry, Fail?

THE LIGHTER SIDE OF PERSONAL COMPUTING

By Bill Howard



Corporation is a registered trademark of Dell Computer Corporation. All rights reserved. No anchovies unless otherwise specified. Dell Computer Corporation. Dell Computer Corporation. Dell Computer Corporation.

Usually the boilerplate disclaimers on ads are painfully dull. Not so this one sentence from a spring 1992 Dell Computer Corp. catalog.

Advice from Abroad

A letter to the editor in England's *New Scientist* magazine (April 25, 1992) by a Michael Bell of Hitchin, Hertfordshire, offered this laptop tip: "If you drop a 'tired' [nickel cadmium] battery about a foot onto a concrete floor a few times it renews the battery wonderfully. The theory (folklore?) is that a layer of crystals builds up around the electrodes, and dropping the battery breaks up the crystals."

John Roach Gets No Argument from Us

From Tandy chairman John V. Roach's "Chairman's Thoughts" column in a Radio Shack flyer:

"Radio Shack offers exciting technology-driven products as well. Literally everything we sell has been the latest in technology at some point during the last 70 years."

Amazing Facts

"Apple Macintosh and IBM computers are compatible, so either system can operate with the other's software."

—*TRI-VALLEY HERALD*, PLEASANTON, CALIFORNIA, MAY 24, 1992

If your entry is used in *Abort, Retry, Fail?* we'll send you \$50 and a *PC Magazine* T-shirt. Caution: In case of multiple entries, the postmark date, neatness, and completeness of each entry are considered. Winners this issue: Guy Lawyer (anchovies), Paul Somerson (battery tip), George Barlow (70-year-old technology), Gerald C. Saale (836SX chip and 80287 motherboard), Michael Clapp (IBMs compatible with Macs), Jerry Stillings (garage sale), John L. Hackney (melt customers).

Smell the Coffee

Several readers good-naturedly took us to task for getting the name wrong on Ashton-Tate's once and former database (ARF? Special Edition, January 14, 1992). It's "Rapid File," they told us, not "Rapid Fail." Sorry you didn't get it, fellas: That was a play on words used by PC-industry insiders.

Classified Intelligence

"Attention: To the lady who bought the Commodore computer equipment at 758 S. Second St., May 21st! You got MY APPLE computer equipment by mistake. Please Call ME! The Garage Sale Lady's Frustrated Husband."

—*THE TIMES*, FRANKFORT, INDIANA, MAY 27, 1992

"Help Wanted—Experienced Computer Technician for a growing business needs to have sales experience. Novell Certification a plus. Must be able to melt customers. Send resume. . ."

—*VALLEY NEWS*, LEBANON, NEW HAMPSHIRE, MAY 26, 1992



RICHARD TENNANT

the January 17, 1989, issue.

Harvard B-School Case Studies For the Ages

WINNER

Ashton-Tate. Back-to-back purchases of about-to-tumble Connecticut software companies (Softword Systems, Decision Resources) and their Bronze Age programs (MultiMate, Chart Master) plus the dBASE IV bug fiasco. Not to mention *Friday*, *Byline*, and *Rapid Fail*. They teach more business sense at Hamburger U.

HONORABLE MENTION

Rapid Fail: It was a joke. In more ways than one.



How to Maximize Your PC, a \$50 hardware-reference manual advertised by WEKA Publishing, describes "a cheap motherboard upgrade" using the "836SX" chip in which you "replace the old 80287 motherboard."